US010372394B2

(12) **United States Patent**
Otsuka et al.

(10) **Patent No.: US 10,372,394 B2**
(45) **Date of Patent: Aug. 6, 2019**

(54) **INFORMATION PROCESSING APPARATUS AND NON-TRANSITORY RECORDING MEDIUM**

(71) Applicant: **Konica Minolta, Inc.**, Tokyo (JP)

(72) Inventors: **Takashi Otsuka**, Kobe (JP); **Kazuma Maruyama**, Nishinomiya (JP)

(73) Assignee: **Konica Minolta, Inc.**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/592,449**

(22) Filed: **May 11, 2017**

(65) **Prior Publication Data**

US 2017/0329563 A1 Nov. 16, 2017

(30) **Foreign Application Priority Data**

May 11, 2016 (JP) 2016-095140

(51) **Int. Cl.**
G06F 3/12 (2006.01)

(52) **U.S. Cl.**
CPC ***G06F 3/1258*** (2013.01); ***G06F 3/1204*** (2013.01); ***G06F 3/1205*** (2013.01); ***G06F 3/1257*** (2013.01)

(58) **Field of Classification Search**
CPC combination set(s) only.
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2010/0085599 A1* 4/2010 Nomura G06F 3/1204 358/1.15
2011/0199640 A1* 8/2011 Shirai G06F 3/1204 358/1.15
2015/0138579 A1* 5/2015 Miyazaki H04N 1/00007 358/1.13
2016/0360061 A1* 12/2016 Akiyama H04N 1/32112
2017/0111533 A1* 4/2017 Sako H04N 1/00832
2017/0173889 A1* 6/2017 Thomas-Lepore G06F 21/31
2017/0322754 A1* 11/2017 Saito G06F 3/1225

FOREIGN PATENT DOCUMENTS

JP 2006-285476 10/2016

* cited by examiner

Primary Examiner — Helen Zong
(74) *Attorney, Agent, or Firm* — Baker Hostetler

(57) **ABSTRACT**

An information processing apparatus comprises a storage. The information processing apparatus starts an installer to install a printer driver on the storage. The installer comprises: a registration screen controller that displays a print setting registration screen about a print setting settable at the printer driver; an installation default generating part that generates an installation default print setting about at least one print setting item based on operation for print setting registration on the print setting registration screen by a user; and an output part that outputs the installation default print setting to the printer driver at the time of installation of the printer driver. The printer driver comprises a print setting managing part that stores the installation default print setting output from the installer into a first storage region in the storage, and manages the stored installation default print setting, the first storage region being a region not rewritable.

20 Claims, 15 Drawing Sheets

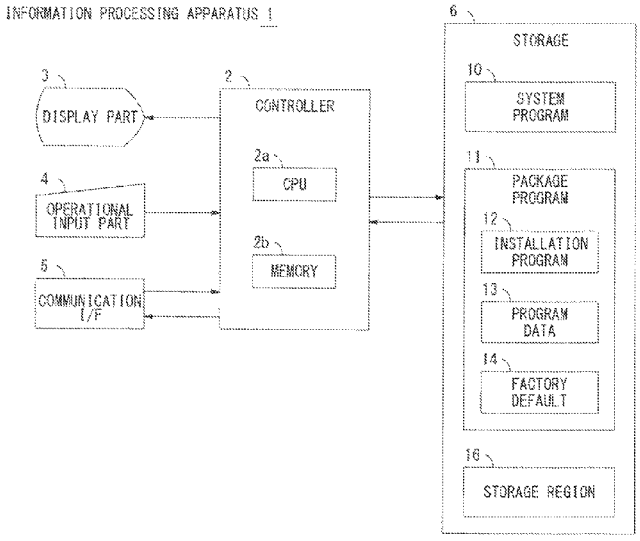
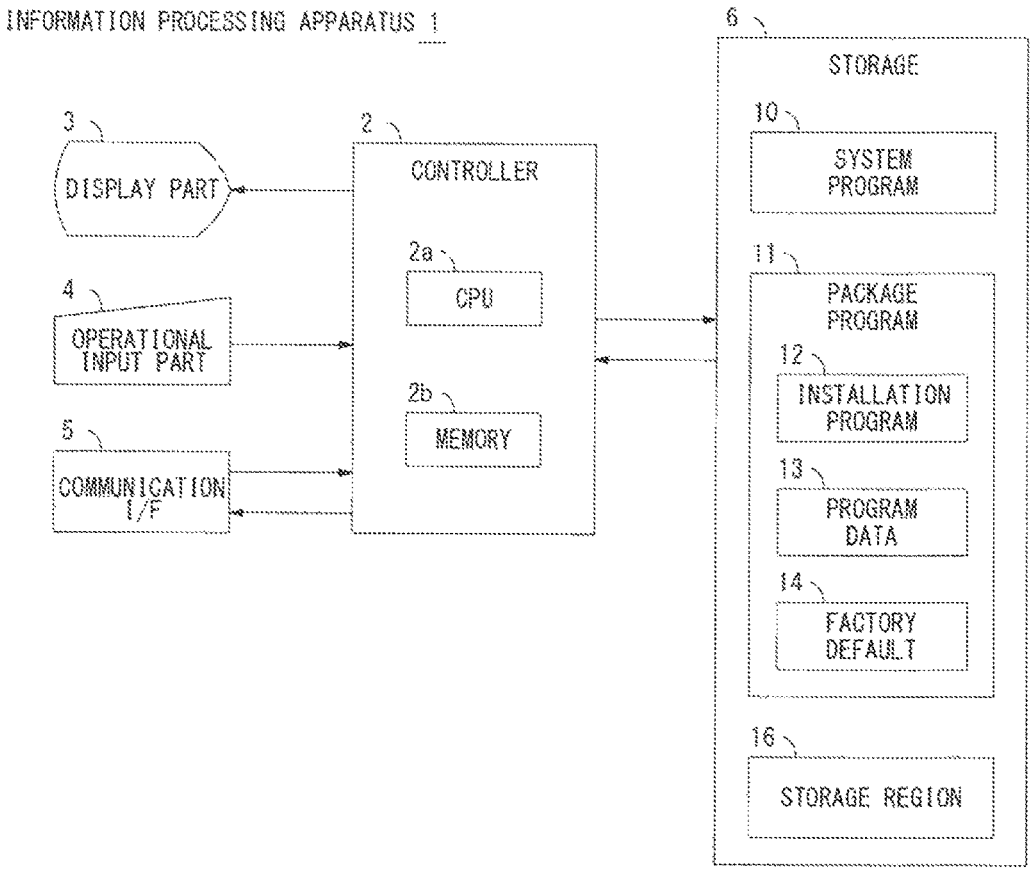


FIG. 1


INFORMATION PROCESSING APPARATUS 1
3
DISPLAY PART
4
OPERATIONAL INPUT PART
5
COMMUNICATION I/F
2
CONTROLLER
2a
CPU
2b
MEMORY
6
STORAGE
10
SYSTEM PROGRAM
11
PACKAGE PROGRAM
12
INSTALLATION PROGRAM
13
PROGRAM DATA
14
FACTORY DEFAULT
16
STORAGE REGION

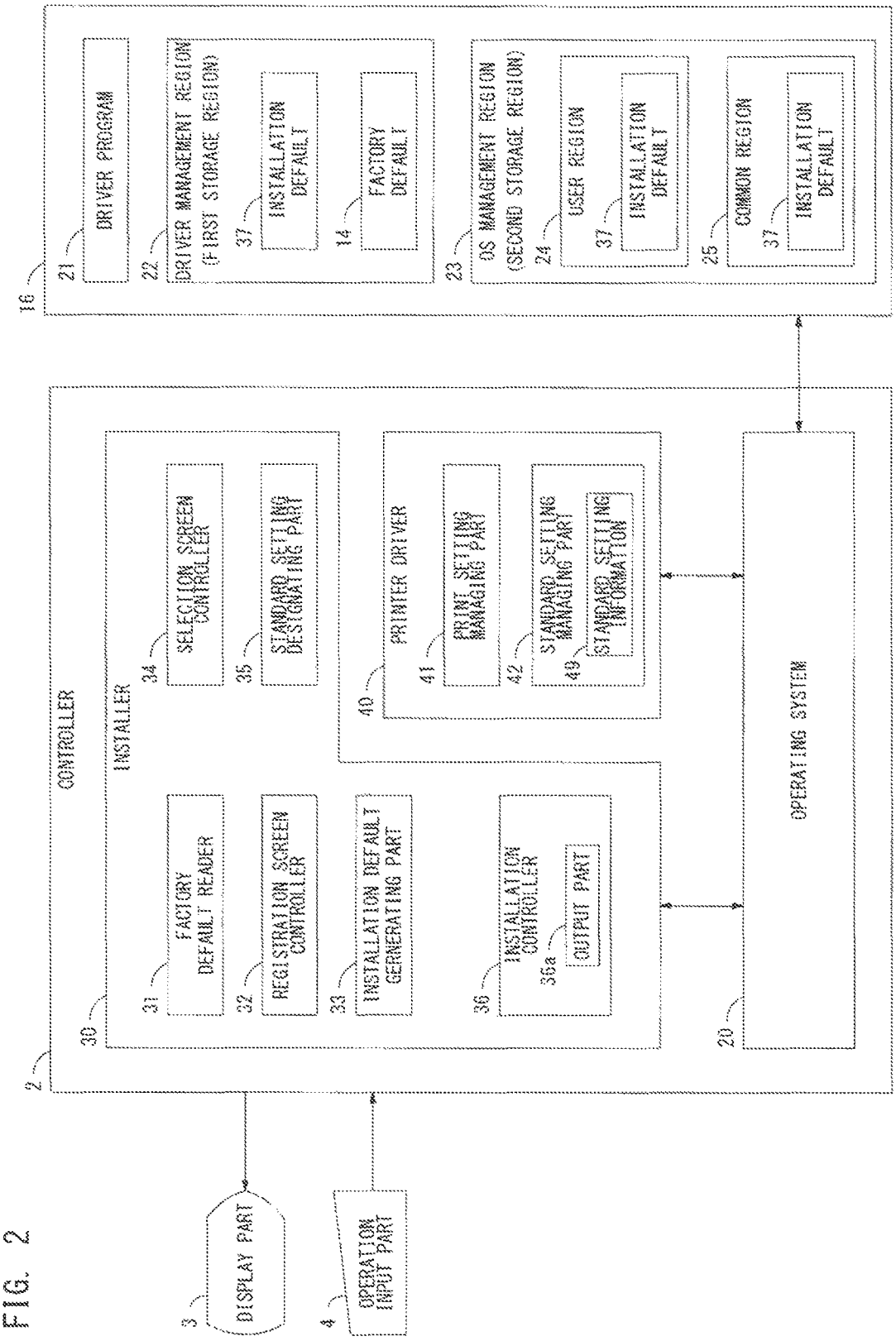
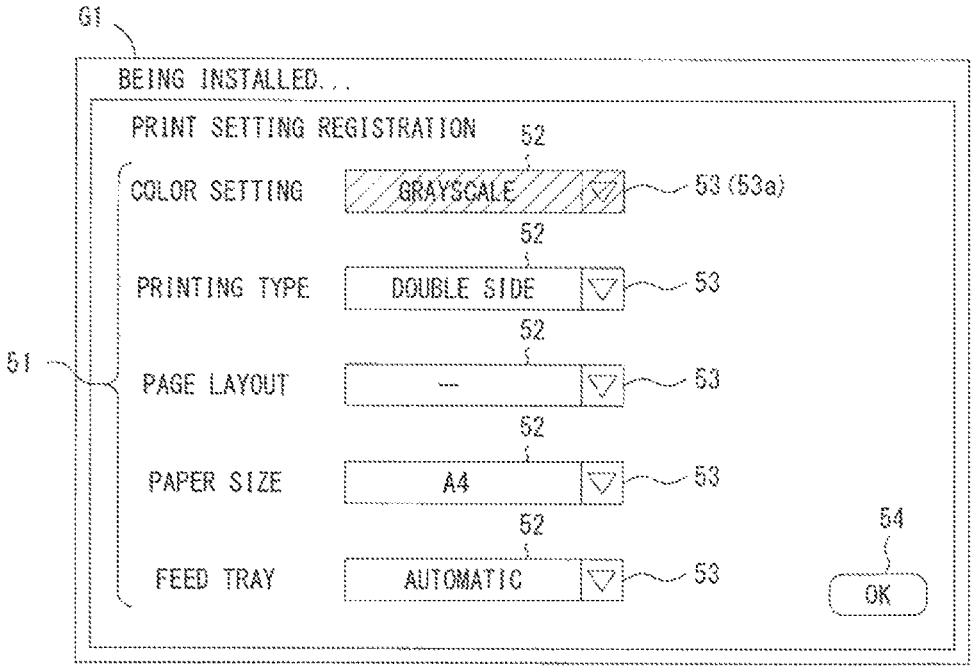

16
21
DRIVER PROGRAM
22
DRIVER MANAGEMENT REGION (FIRST STORAGE REGION)
37
INSTALLATION DEFAULT
14
FACTORY DEFAULT
23
OS MANAGEMENT REGION (SECOND STORAGE REGION)
24
USER REGION
37
INSTALLATION DEFAULT
25
COMMON REGION
37
INSTALLATION DEFAULT
2
CONTROLLER
30
INSTALLER
31
FACTORY DEFAULT READER
32
REGISTRATION SCREEN CONTROLLER
33
INSTALLATION DEFAULT GENERATING PART
34
SELECTION SCREEN CONTROLLER
35
STANDARD SETTING DESIGNATING PART
36
INSTALLATION CONTROLLER
36a
OUTPUT PART
40
PRINTER DRIVER
41
PRINT SETTING MANAGING PART
42
STANDARD SETTING MANAGING PART
49
STANDARD SETTING INFORMATION
20
OPERATING SYSTEM
3
DISPLAY PART
4
OPERATION INPUT PART

FIG. 2

FIG. 3


01
BEING INSTALLED...
PRINT SETTING REGISTRATION
51
52
COLOR SETTING
GRAYSCALE
53 (53a)
PRINTING TYPE
DOUBLE SIDE
53
PAGE LAYOUT

53
PAPER SIZE
A4
53
FEED TRAY
AUTOMATIC
53
54
OK

FIG. 4A

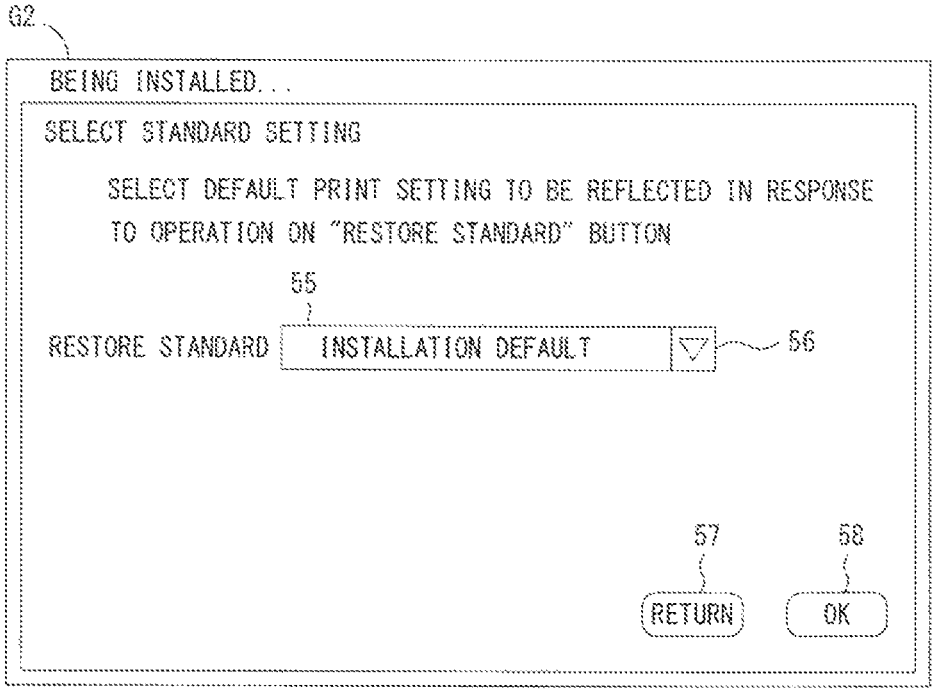
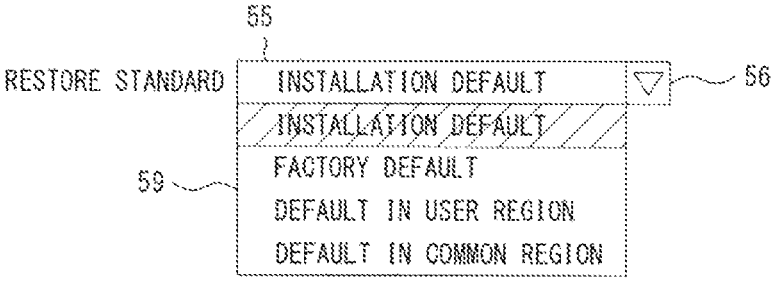

62
BEING INSTALLED...
SELECT STANDARD SETTING
SELECT DEFAULT PRINT SETTING TO BE REFLECTED IN RESPONSE TO OPERATION ON "RESTORE STANDARD" BUTTON
55
RESTORE STANDARD
INSTALLATION DEFAULT
56
57
58
RETURN
OK

FIG. 4B


55
RESTORE STANDARD
INSTALLATION DEFAULT
56
INSTALLATION DEFAULT
FACTORY DEFAULT
59
DEFAULT IN USER REGION
DEFAULT IN COMMON REGION

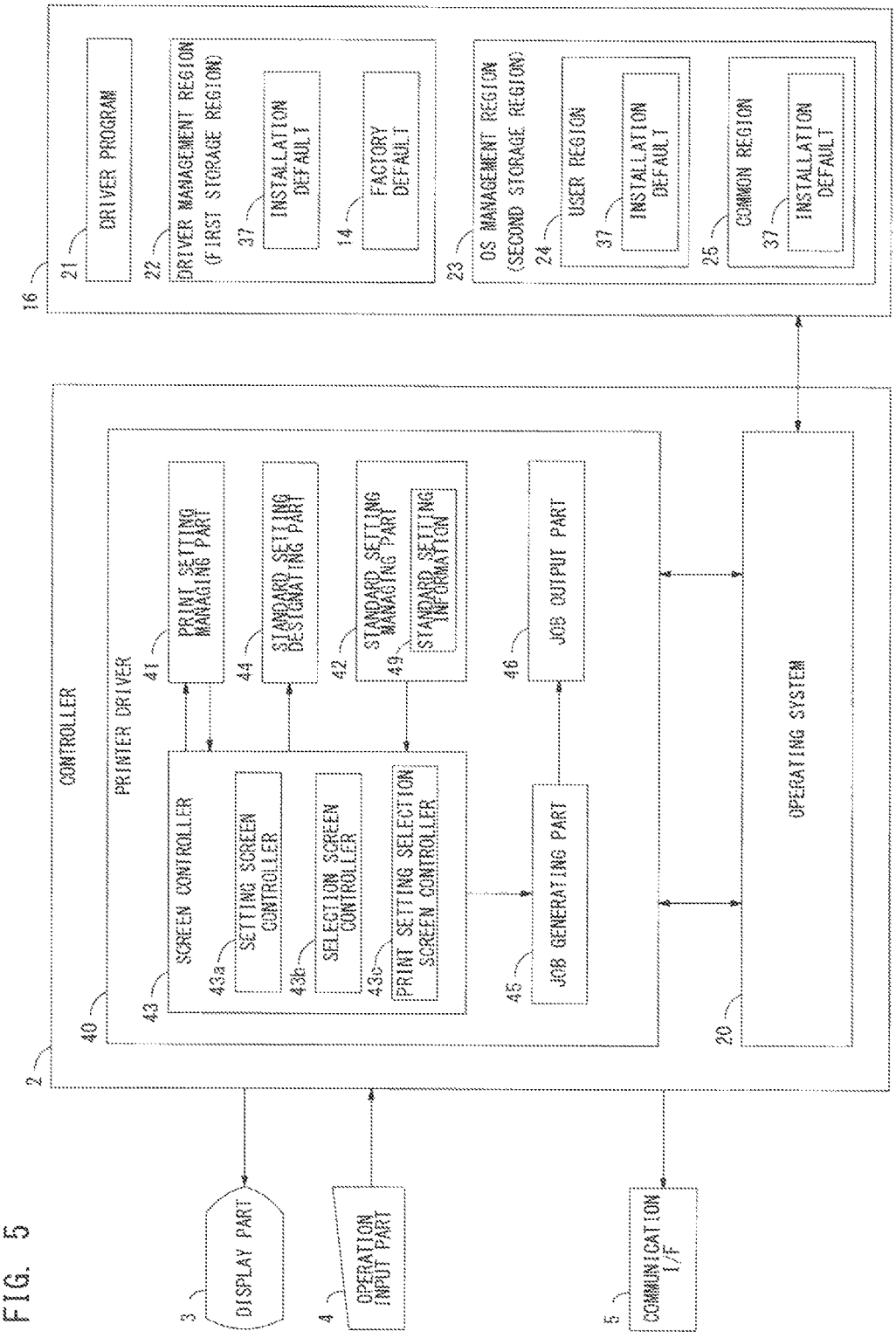

16
21
DRIVER PROGRAM
22
DRIVER MANAGEMENT REGION (FIRST STORAGE REGION)
37
INSTALLATION DEFAULT
14
FACTORY DEFAULT
23
OS MANAGEMENT REGION (SECOND STORAGE REGION)
24
USER REGION
37
INSTALLATION DEFAULT
25
COMMON REGION
37
INSTALLATION DEFAULT
2
CONTROLLER
40
PRINTER DRIVER
41
PRINT SETTING MANAGING PART
44
STANDARD SETTING DESIGNATING PART
42
STANDARD SETTING MANAGING PART
49
STANDARD SETTING INFORMATION
46
JOB OUTPUT PART
43
SCREEN CONTROLLER
43a
SETTING SCREEN CONTROLLER
43b
SELECTION SCREEN CONTROLLER
43c
PRINT SETTING SELECTION SCREEN CONTROLLER
45
JOB GENERATING PART
20
OPERATING SYSTEM
3
DISPLAY PART
4
OPERATION INPUT PART
5
COMMUNICATION I/F

FIG. 5

FIG. 6

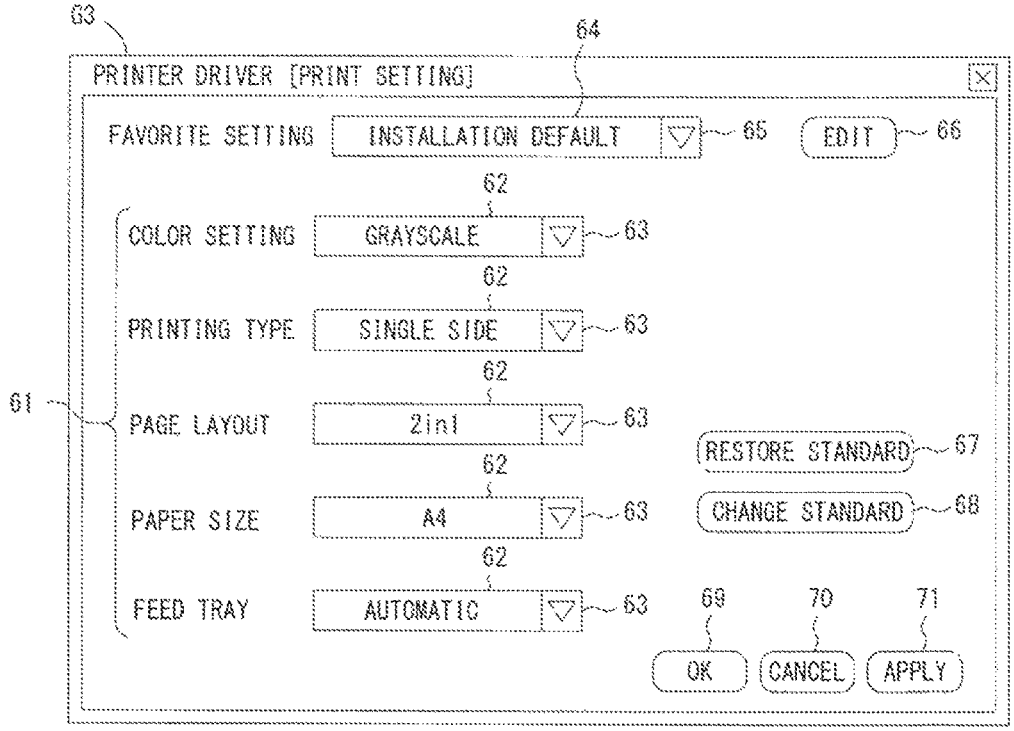

63
64
PRINTER DRIVER [PRINT SETTING]
FAVORITE SETTING
INSTALLATION DEFAULT
65
EDIT
66
62
COLOR SETTING
GRAYSCALE
63
62
PRINTING TYPE
SINGLE SIDE
63
62
61
PAGE LAYOUT
2in1
63
RESTORE STANDARD
67
62
PAPER SIZE
A4
63
CHANGE STANDARD
68
62
FEED TRAY
AUTOMATIC
63
69
70
71
OK
CANCEL
APPLY

FIG. 7

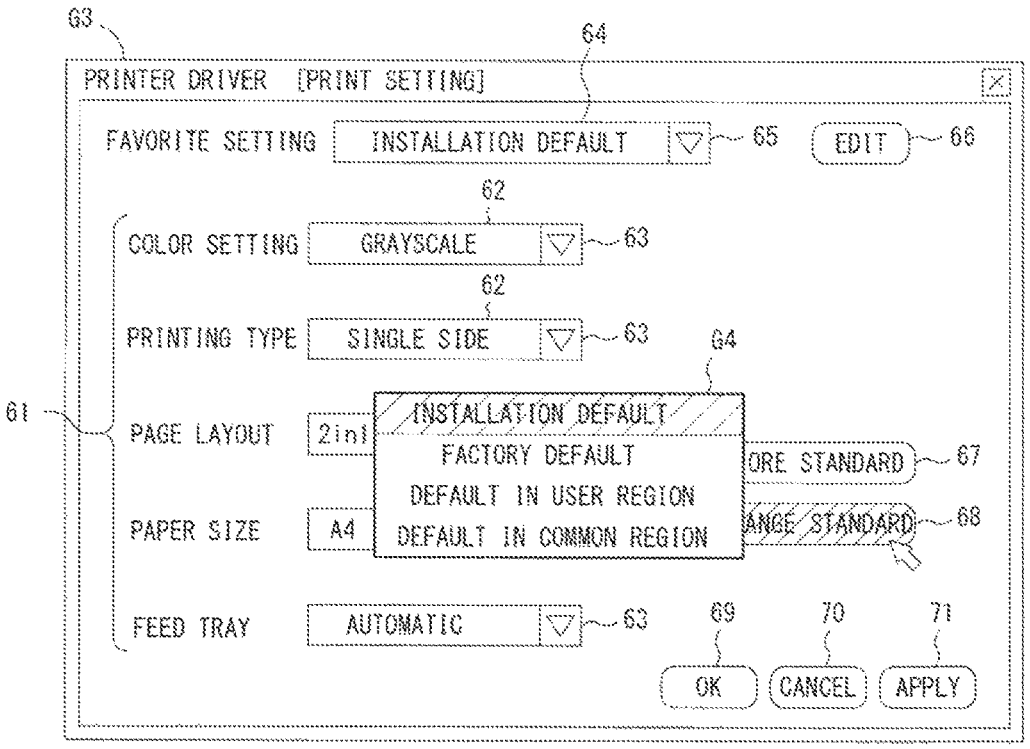

63
64
PRINTER DRIVER [PRINT SETTING]
FAVORITE SETTING
INSTALLATION DEFAULT
65
EDIT
66
62
COLOR SETTING
GRAYSCALE
63
62
PRINTING TYPE
SINGLE SIDE
63
64
61
PAGE LAYOUT
2in1
INSTALLATION DEFAULT
FACTORY DEFAULT
DEFAULT IN USER REGION
DEFAULT IN COMMON REGION
ORE STANDARD
67
PAPER SIZE
A4
ANGE STANDARD
68
FEED TRAY
AUTOMATIC
63
69
70
71
OK
CANCEL
APPLY

FIG. 8A

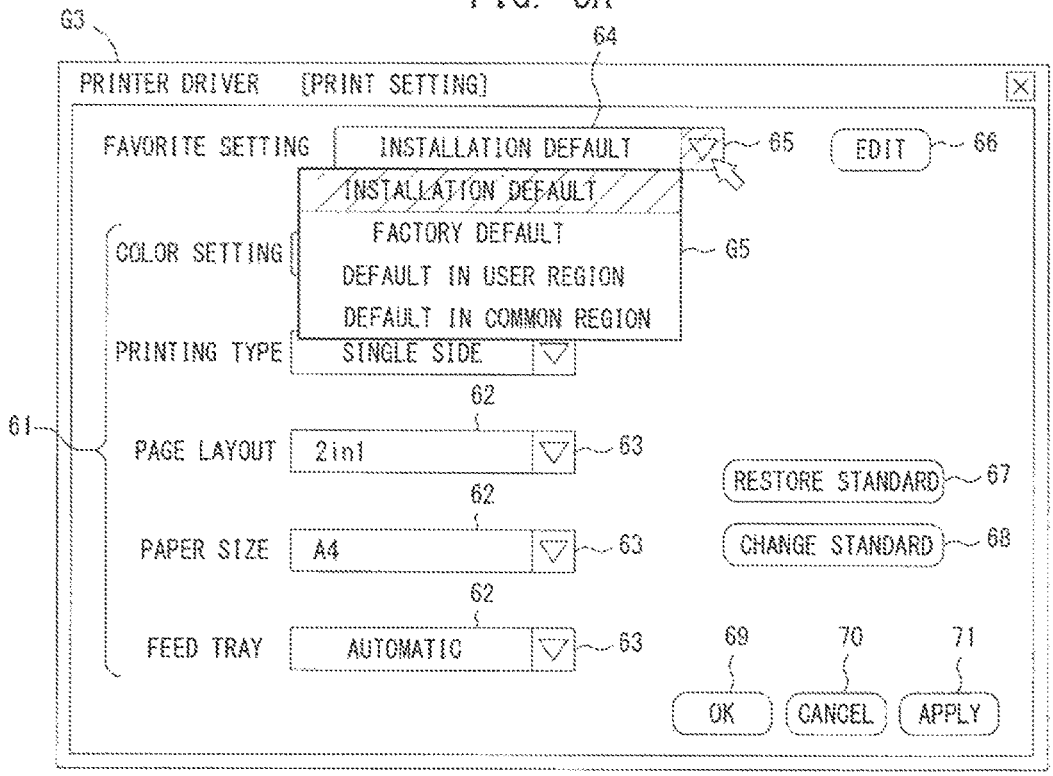

63
64
PRINTER DRIVER [PRINT SETTING]
FAVORITE SETTING
INSTALLATION DEFAULT
65
EDIT
66
INSTALLATION DEFAULT
FACTORY DEFAULT
DEFAULT IN USER REGION
DEFAULT IN COMMON REGION
65
COLOR SETTING
PRINTING TYPE
SINGLE SIDE
62
61
PAGE LAYOUT
2in1
63
RESTORE STANDARD
67
62
PAPER SIZE
A4
63
CHANGE STANDARD
68
62
FEED TRAY
AUTOMATIC
63
69
70
71
OK
CANCEL
APPLY

FIG. 8B

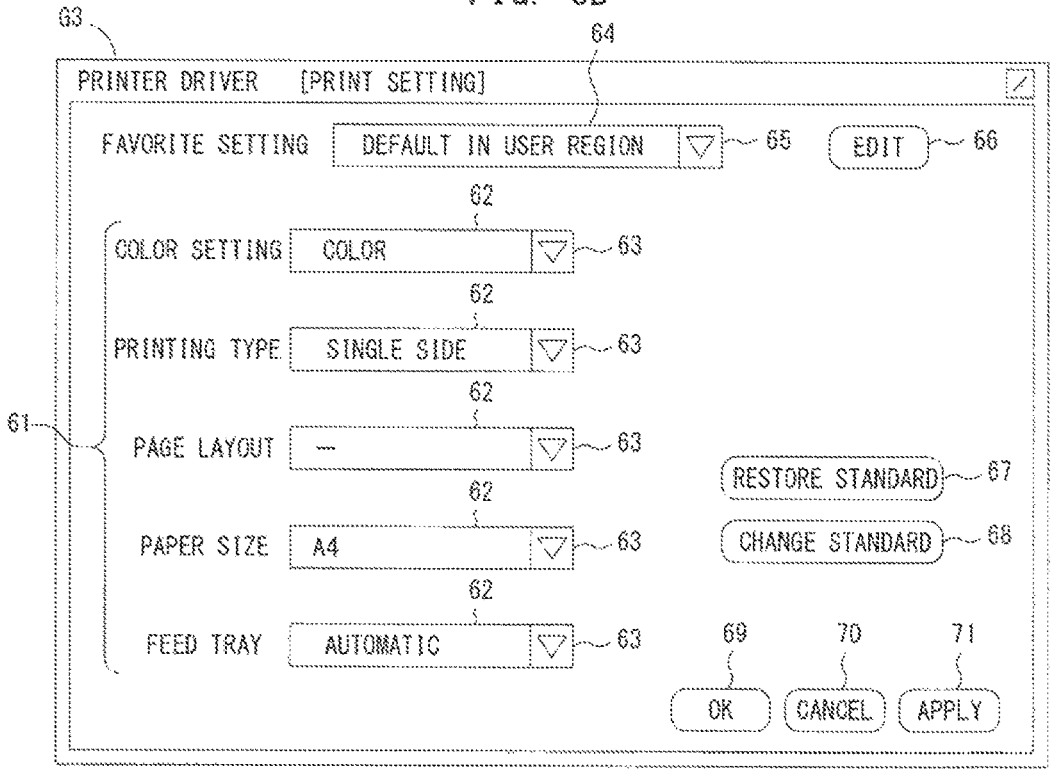

63
64
PRINTER DRIVER [PRINT SETTING]
FAVORITE SETTING
DEFAULT IN USER REGION
65
EDIT
66
62
COLOR SETTING
COLOR
63
62
PRINTING TYPE
SINGLE SIDE
63
62
61
PAGE LAYOUT
—
63
RESTORE STANDARD
67
62
PAPER SIZE
A4
63
CHANGE STANDARD
68
62
FEED TRAY
AUTOMATIC
63
69
70
71
OK
CANCEL
APPLY

FIG. 9

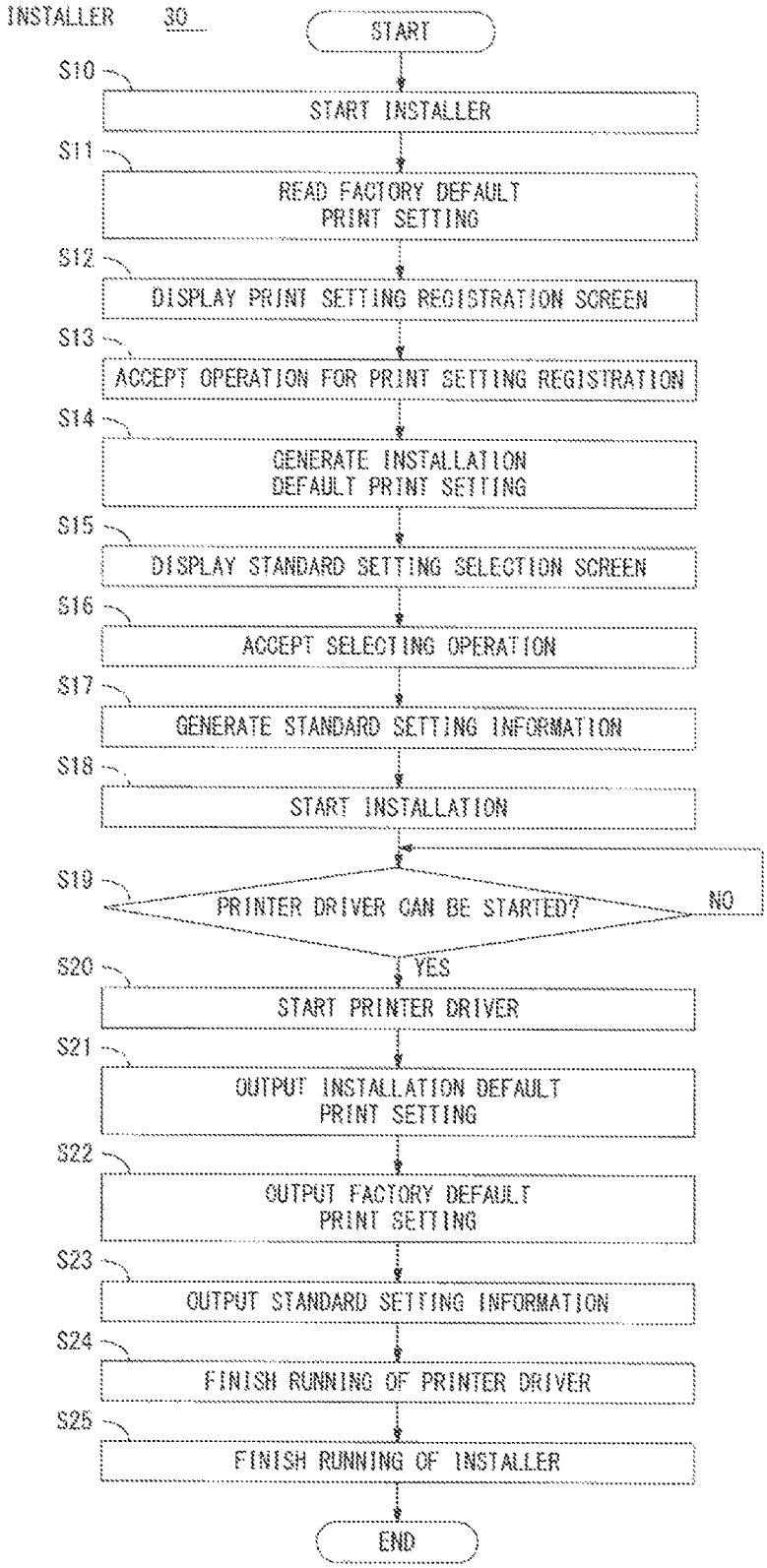

INSTALLER 30
START
S10
START INSTALLER
S11
READ FACTORY DEFAULT PRINT SETTING
S12
DISPLAY PRINT SETTING REGISTRATION SCREEN
S13
ACCEPT OPERATION FOR PRINT SETTING REGISTRATION
S14
GENERATE INSTALLATION DEFAULT PRINT SETTING
S15
DISPLAY STANDARD SETTING SELECTION SCREEN
S16
ACCEPT SELECTING OPERATION
S17
GENERATE STANDARD SETTING INFORMATION
S18
START INSTALLATION
S19
PRINTER DRIVER CAN BE STARTED?
NO
YES
S20
START PRINTER DRIVER
S21
OUTPUT INSTALLATION DEFAULT PRINT SETTING
S22
OUTPUT FACTORY DEFAULT PRINT SETTING
S23
OUTPUT STANDARD SETTING INFORMATION
S24
FINISH RUNNING OF PRINTER DRIVER
S25
FINISH RUNNING OF INSTALLER
END

FIG. 10

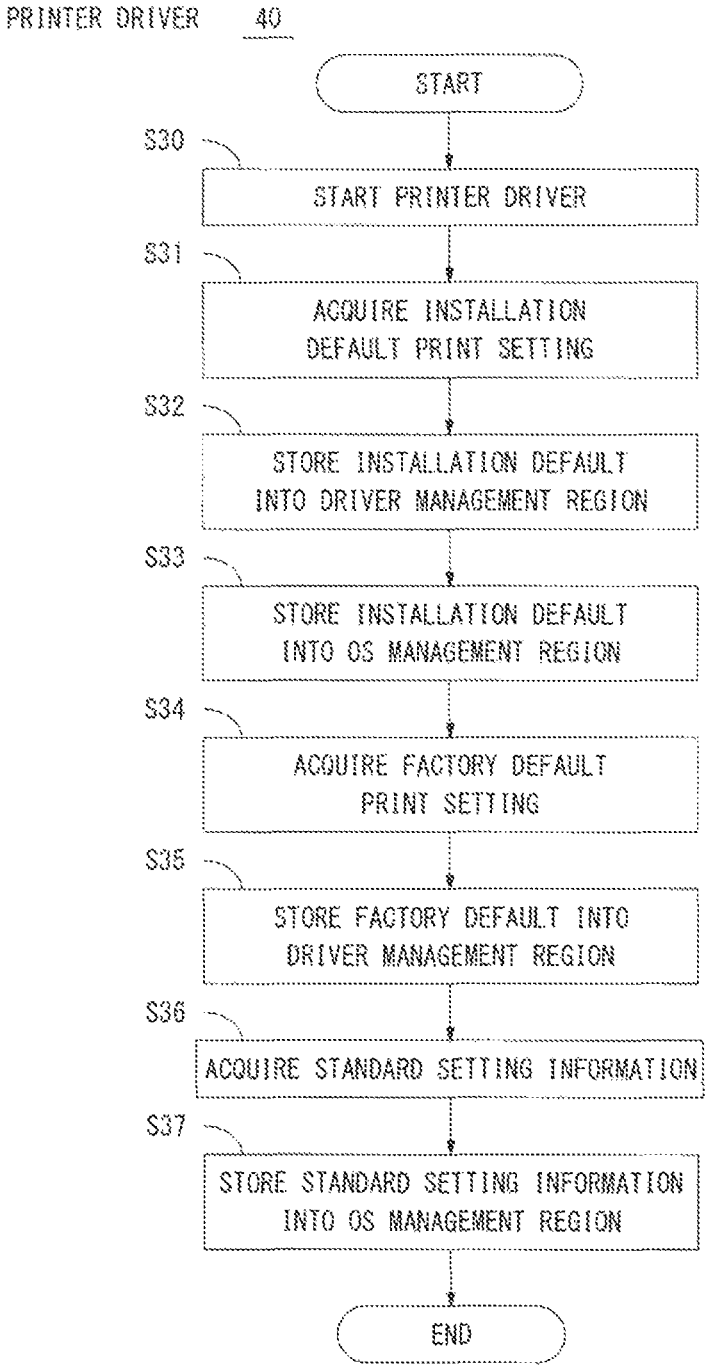

PRINTER DRIVER 40
START
S30
START PRINTER DRIVER
S31
ACQUIRE INSTALLATION DEFAULT PRINT SETTING
S32
STORE INSTALLATION DEFAULT INTO DRIVER MANAGEMENT REGION
S33
STORE INSTALLATION DEFAULT INTO OS MANAGEMENT REGION
S34
ACQUIRE FACTORY DEFAULT PRINT SETTING
S35
STORE FACTORY DEFAULT INTO DRIVER MANAGEMENT REGION
S36
ACQUIRE STANDARD SETTING INFORMATION
S37
STORE STANDARD SETTING INFORMATION INTO OS MANAGEMENT REGION
END

FIG. 11

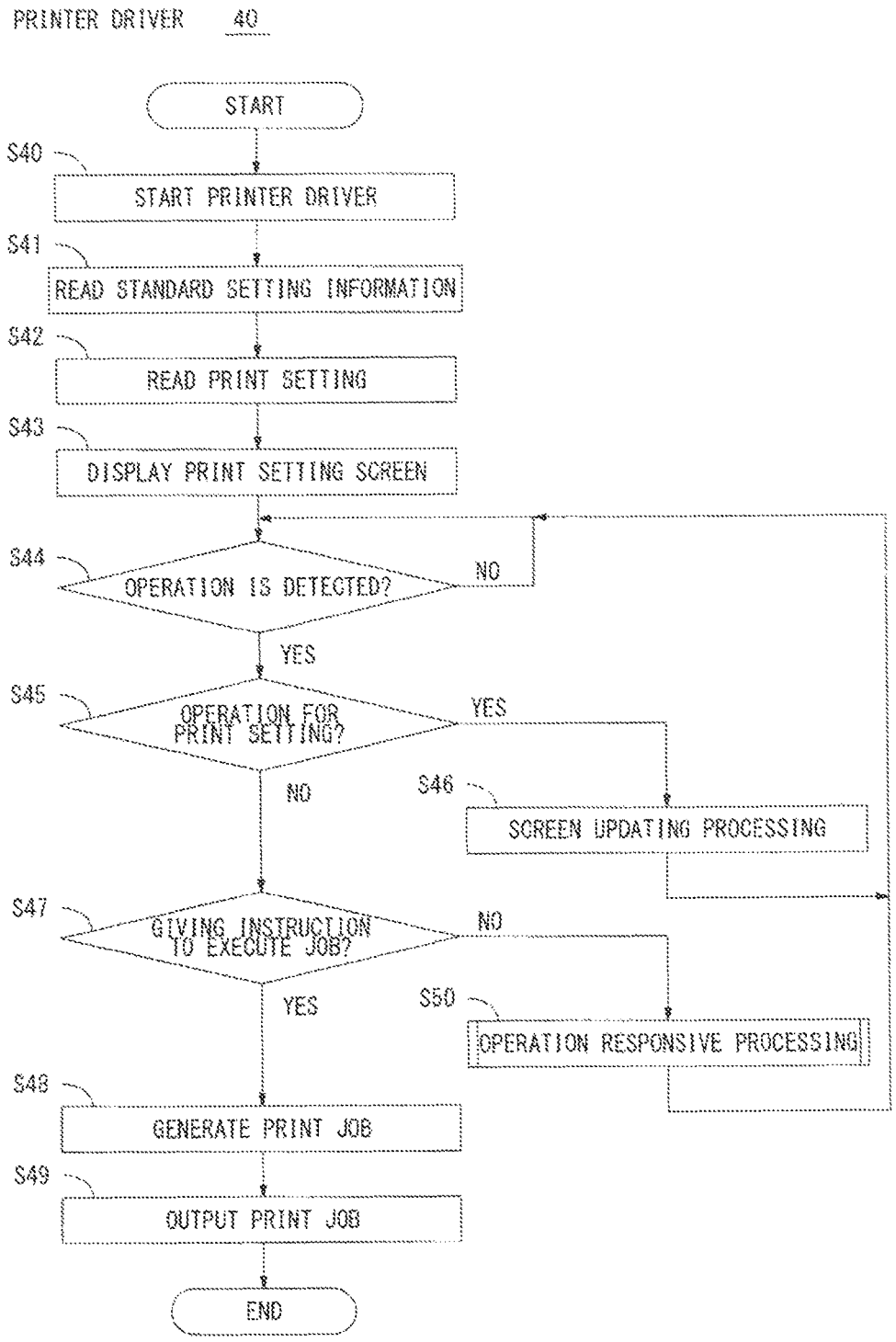

PRINTER DRIVER 40
START
S40
START PRINTER DRIVER
S41
READ STANDARD SETTING INFORMATION
S42
READ PRINT SETTING
S43
DISPLAY PRINT SETTING SCREEN
S44
OPERATION IS DETECTED?
NO
YES
S45
OPERATION FOR PRINT SETTING?
YES
NO
S46
SCREEN UPDATING PROCESSING
S47
GIVING INSTRUCTION TO EXECUTE JOB?
NO
YES
S50
OPERATION RESPONSIVE PROCESSING
S48
GENERATE PRINT JOB
S49
OUTPUT PRINT JOB
END

FIG. 12

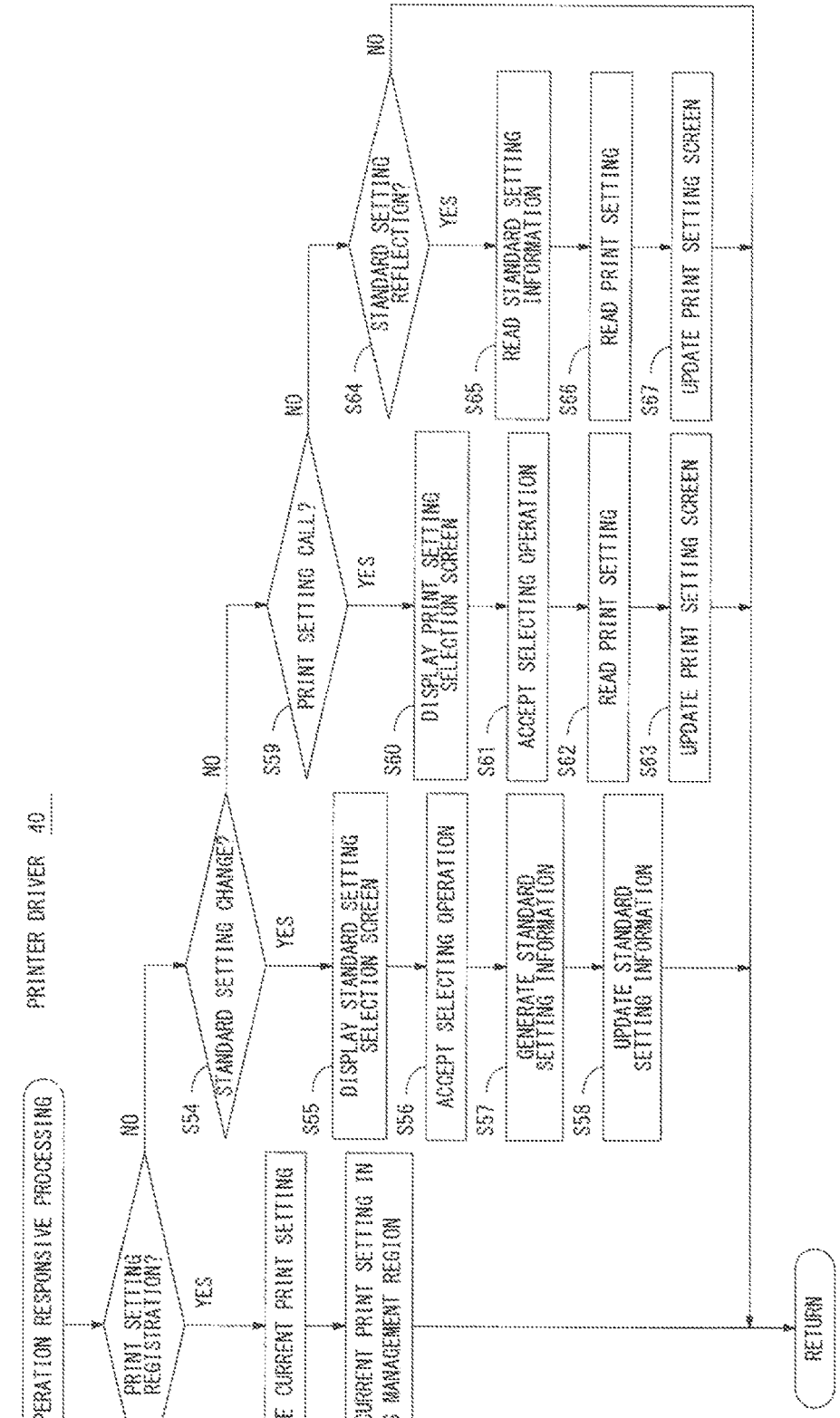

PRINTER DRIVER 40
S50
OPERATION RESPONSIVE PROCESSING
S51
PRINT SETTING REGISTRATION?
YES
NO
S52
ACQUIRE CURRENT PRINT SETTING
S53
STORE CURRENT PRINT SETTING IN OS MANAGEMENT REGION
S54
STANDARD SETTING CHANGE?
YES
NO
S55
DISPLAY STANDARD SETTING SELECTION SCREEN
S56
ACCEPT SELECTING OPERATION
S57
GENERATE STANDARD SETTING INFORMATION
S58
UPDATE STANDARD SETTING INFORMATION
S59
PRINT SETTING CALL?
YES
NO
S60
DISPLAY PRINT SETTING SELECTION SCREEN
S61
ACCEPT SELECTING OPERATION
S62
READ PRINT SETTING
S63
UPDATE PRINT SETTING SCREEN
S64
STANDARD SETTING REFLECTION?
YES
NO
S65
READ STANDARD SETTING INFORMATION
S66
READ PRINT SETTING
S67
UPDATE PRINT SETTING SCREEN
RETURN

FIG. 13

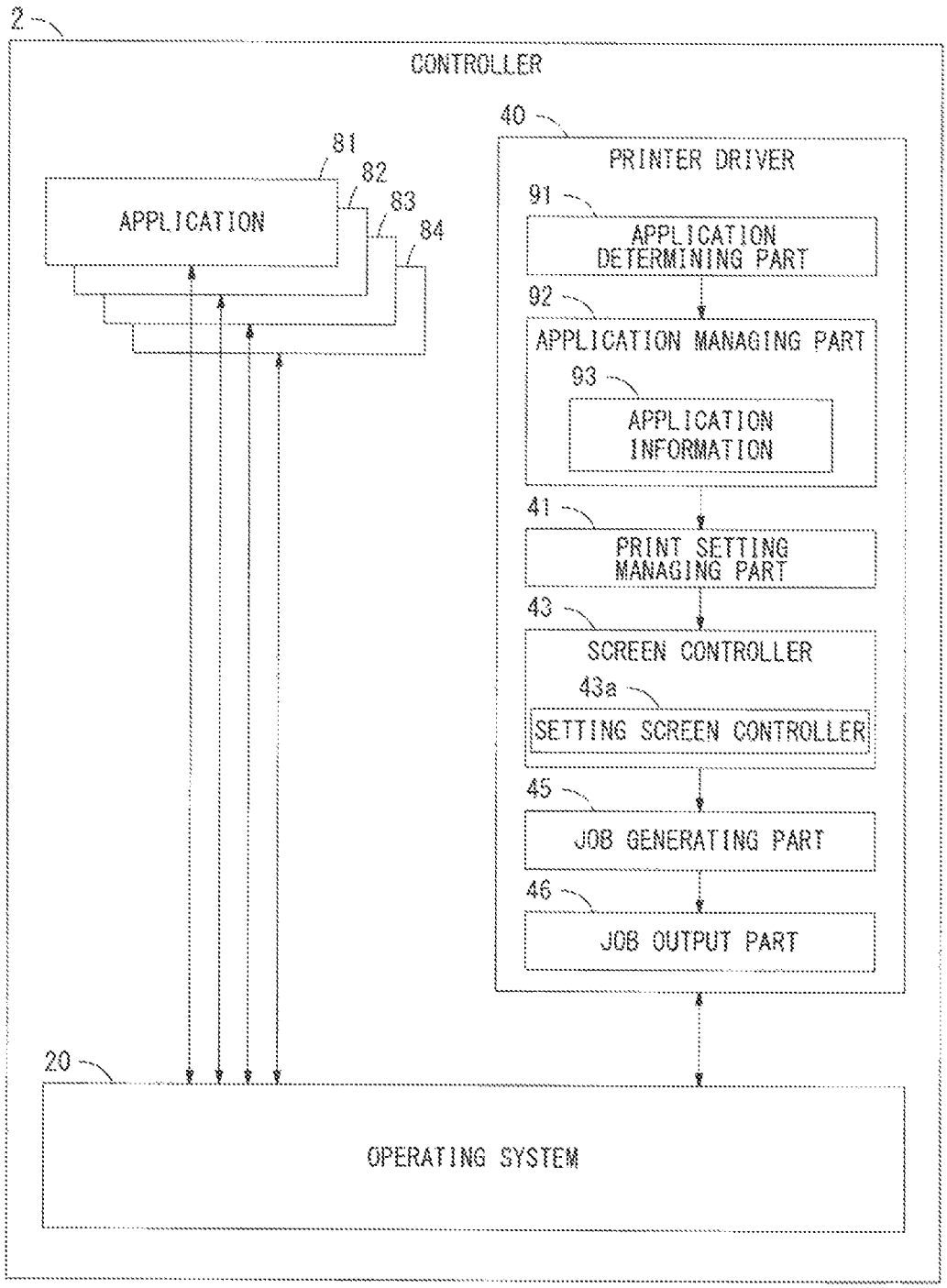
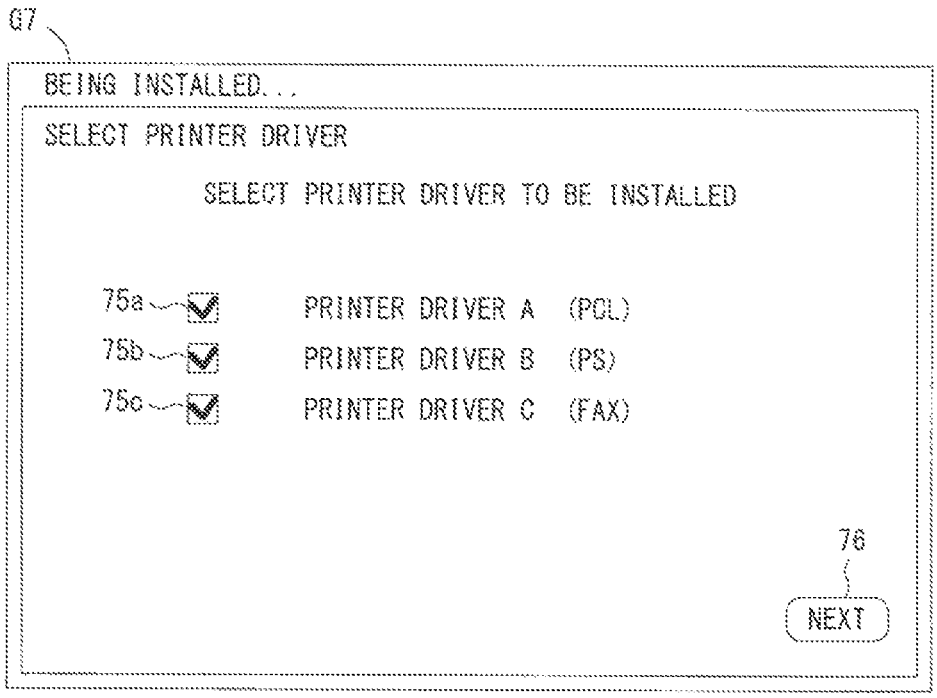

2
CONTROLLER
40
PRINTER DRIVER
81
82
83
84
APPLICATION
91
APPLICATION DETERMINING PART
92
APPLICATION MANAGING PART
93
APPLICATION INFORMATION
41
PRINT SETTING MANAGING PART
43
SCREEN CONTROLLER
43a
SETTING SCREEN CONTROLLER
45
JOB GENERATING PART
46
JOB OUTPUT PART
20
OPERATING SYSTEM

FIG. 14

APPLICATION INFORMATION 93

93a APPLICATION	93b DEFAULT SETTING
APPLICATION A	INSTALLATION DEFAULT
APPLICATION B	DEFAULT IN USER REGION
APPLICATION C	DEFAULT IN COMMON REGION
APPLICATION D	INSTALLATION DEFAULT

FIG. 15


67
BEING INSTALLED...
SELECT PRINTER DRIVER
SELECT PRINTER DRIVER TO BE INSTALLED
75a
PRINTER DRIVER A (PCL)
75b
PRINTER DRIVER B (PS)
75c
PRINTER DRIVER C (FAX)
76
NEXT

INFORMATION PROCESSING APPARATUS AND NON-TRANSITORY RECORDING MEDIUM

The present U.S. patent application claims priority under the Paris Convention and 35 U.S.C. § 119 to Japanese Patent Application No. 2016-095140 filed on May 11, 2016, the entirety of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates an information processing apparatus and a non-transitory recording medium.

Description of the Background Art

An information processing apparatus such as a personal computer (PC) becomes capable of outputting a print job to a printing apparatus connected on a network, etc., by installing a printer driver on the information processing apparatus. The printer driver is capable of making a print setting corresponding to a print function of the printing apparatus. For example, if the printer driver is started in the information processing apparatus, a print setting screen containing a plurality of print setting items is displayed on a display part of the information processing apparatus. Thus, a user is allowed to reflect an intended print setting in the printer driver by inputting an intended set value about each of the print setting items in the print setting screen.

The printer driver is installed on the information processing apparatus together with a factory default print setting containing a default value set in advance about each of the print setting items at a factory before shipment. The factory default print setting is used as an initial value of a print setting for the printer driver. Meanwhile, a user is allowed to change a setting so as to use an intended print setting as an initial value instead of the factory default print setting by performing setting operation in the above-described print setting screen.

According to a technique conventionally suggested, a first default value and a second default value are stored in a printer driver such as the one described above (this technique is disclosed in Japanese Patent Application Laid-Open No. 2006-285476 for example). If a user gives an instruction to read the first default value, the printer driver according to this conventional technique reads the first default value and reflects the read first default value in a print setting. If the user gives an instruction to read the second default value, the printer driver reads the second default value and reflects the read second default value in a print setting.

The above-described conventional technique encounters a problem in that, if the user rewrites both the first default value and the second default value, these default values cannot be restored to their original default values. For example, when the printer driver installed on an information processing apparatus is started for the first time, the user makes a print setting to be used frequently by the user himself or herself while examining each print setting item in detail. Then, the user registers the resultant print setting as an initial value to take the place of a factory default print setting. If the user thereafter erroneously rewrites the intended print setting, having been registered as the initial value, as a different print setting, the original print setting cannot be restored by simple operation such as one-click operation. Hence, like in the case of initial start, the user is necessitated to restore the original print setting by examining each print setting item in detail.

According to a different existing printer driver, even if a user accidentally rewrites an intended print setting as a different print setting, a factory default print setting can be restored by simple operation such as one-click operation. In many cases, however, the user does not know the details of the factory default print setting. Hence, great importance cannot be found in restoring the factory default print setting.

SUMMARY OF THE INVENTION

The present invention has been made to solve the above-described problems. The present invention is intended to provide an information processing apparatus and a non-transitory recording medium capable of restoring an intended print setting input for the first time by a user through simple operation.

First, the present invention is directed to an information processing apparatus that comprises a storage and starts an installer to install a printer driver on the storage.

To achieve at least one of the abovementioned objects, according to one aspect of the present invention, the information processing apparatus starts the installer which comprises: a registration screen controller that displays a print setting registration screen about a print setting settable at the printer driver; an installation default generating part that generates an installation default print setting about at least one print setting item based on operation for print setting registration on the print setting registration screen by a user; and an output part that outputs the installation default print setting to the printer driver at the time of installation of the printer driver. Further, the printer driver comprises a print setting managing part that stores the installation default print setting output from the installer into a first storage region in the storage, and manages the stored installation default print setting, the first storage region being a region not rewritable for the user.

Second, the present invention is directed to a non-transitory recording medium in which a computer-readable printer driver to be executed by an information processing apparatus comprising a storage is recorded.

To achieve at least one of the abovementioned objects, according to one aspect of the present invention, the printer driver causes the information processing apparatus to execute a first step of storing an installation default print setting about at least one print setting item output from an installer during installation of the printer driver into a first storage region, the first storage region being a region in the storage and not rewritable for a user.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, advantages and features of the present invention will become more fully understood from the detailed description given hereinbelow and the appended drawings which are given by way of illustration only, and thus are not intended as a definition of the limits of the present invention, and wherein:

FIG. **1** shows an example of the hardware configuration of an information processing apparatus;

FIG. **2** is a block diagram showing an example of the functional configuration of a controller formed at the time of installation of a printer driver;

FIG. **3** shows an example of a print setting registration screen;

FIGS. **4**A and **4**B each show an example of a standard setting selection screen displayed at the time of installation of the printer driver;

FIG. **5** is a block diagram showing a functional configuration formed if the printer driver is started normally;

FIG. **6** shows an example of a print setting screen displayed by a setting screen controller;

FIG. **7** shows an example of a standard setting selection screen displayed if the printer driver is started normally;

FIGS. **8**A and **8**B each show a transition between screens made in response to operation for print setting call;

FIG. **9** is a flowchart showing an example of a procedure of processing executed by an installer;

FIG. **10** is a flowchart showing an example of a procedure of processing executed by the printer driver started temporarily at the time of installation of the printer driver;

FIG. **11** is a flowchart showing an example of a procedure of processing executed by the printer driver if the printer driver is started normally;

FIG. **12** is a flowchart showing an example of a detailed procedure of operation responsive processing;

FIG. **13** is a block diagram showing an example of a main functional configuration of a printer driver according to a second preferred embodiment;

FIG. **14** shows an example of application information; and

FIG. **15** shows an example of an initial screen displayed if an installer is started.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will be described in detail below. Components common between the preferred embodiments will be identified by the same reference numbers and will not be discussed repeatedly for the same description.

First Preferred Embodiment

FIG. **1** shows an example of the hardware configuration of an information processing apparatus **1** according to one preferred embodiment of the present invention. The information processing apparatus **1** is formed of a personal computer or a tablet terminal, for example. The information processing apparatus **1** includes a controller **2** with a CPU **2***a* and a memory **2***b*, a display part **3** formed of a color liquid crystal display, for example, an operational input part **4** formed of a keyboard, a mouse, or a touch panel, for example, a communication interface **5** for connection to a network such as a local area network (LAN), and a nonvolatile storage **6** formed of a hard disk drive (HDD) or a solid-state drive (SSD), for example. The information processing apparatus **1** is connected, for example through the communication interface **5**, to a printing apparatus formed of a multifunction peripheral (MFP) or a printer, for example. The information processing apparatus **1** becomes capable of generating a print job executable by the printing apparatus and outputting the generated print job by installing a printer driver corresponding to the printing apparatus on the information processing apparatus **1**.

The storage **6** stores a system program **10** functional as an operating system of the information processing apparatus **1**, and a package program **11** for installation of a driver program **21** for a printer driver **40** described later. The package program **11** contains an installation program **12** for installation of the printer driver **40** on the information processing apparatus **1**, program data **13** about the printer driver **40**, and a factory default print setting **14** containing a default value set in advance about each of a plurality of print setting items settable at the printer driver **40**. The package program **11** may be downloaded through the communication interface **5**, for example. Alternatively, the package program **11** may be acquired from a computer-readable recording medium such as a CD-ROM or a USB memory not shown in the drawings, for example. The storage **6** includes a region in which the system program **10** and the package program **11** are stored. The storage **6** additionally includes a storage region **16** as a free region in which the installed printer driver **40** can be stored.

The CPU **2***a* of the controller **2** is to read a program from the storage **6** and execute the read program. The memory **2***b* is to store temporary data, for example, generated by execution of the program by the CPU **2***a*. If the information processing apparatus **1** is powered on, the CPU **2***a* reads the system program **10** from the storage **6** and executes the read system program **10**. For installation of the printer driver **40** on the information processing apparatus **1** based on operation for instructing the installation by a user, the CPU **2***a* of the controller **2** reads the installation program **12** in the package program **11** from the storage **6** and executes he read installation program **12**. By doing so, the driver program **21** for the printer driver **40** is installed on the storage region **16** as a free region in the storage **6**.

During installation of the printer driver **40**, the information processing apparatus **1** accepts operation for inputting a print setting by a user and registers the input print setting as a default setting for the printer driver **40**. At this time, the information processing apparatus **1** stores the print setting designated by the user into a storage region not rewritable for the user, and manages the stored print setting. The information processing apparatus **1** functioning in this way will be described in detail below.

FIG. **2** is a block diagram showing an example of the functional configuration of the controller **2** formed at the time of installation of the printer driver **40**. In response to execution of the system program **10** by the CPU **2***a*, the controller **2** starts an operating system **20**. If a user instructs installation of the printer driver **40** while the operating system **20** runs in the controller **2**, the controller **2** executes the installation program **12** to start an installer **30**.

As shown in FIG. **2**, the installer **30** includes a factory default reader **31**, a registration screen controller **32**, an installation default generating part **33**, a selection screen controller **34**, a standard setting designating part **35**, and an installation controller **36**.

The factory default reader **31** comes into operation in response to start of the installer **30**. The factory default reader **31** reads the factory default print setting **14** in the package program **11** from the storage **6**. If the factory default reader **31** reads the factory default print setting **14**, the installer **30** puts the registration screen controller **32** into operation.

The registration screen controller **32** executes processing of displaying a print setting registration screen on the display part **3**, and updating the print setting registration screen based on operation by a user. The print setting registration screen is about a print setting settable at the printer driver **40** to be installed. Thus, if the installer **30** is started in the controller **2**, the print setting registration screen is displayed on the display part **3**.

FIG. **3** shows an example of a print setting registration screen G**1**. The displayed print setting registration screen G**1** contains a plurality of print setting items **51** settable at the

printer driver **40** to be installed. Each print setting item **51** contains a set value display field **52** in which a current set value is displayed, and an operation button **53** used for displaying a pull-down menu if a user intends to change a set value displayed in each set value display field **52**. The print setting registration screen G**1** further contains a button **54** used for registering a print setting including a set value displayed in each set value display field **52** as an installation default print setting.

For display of the print setting registration screen G**1** such as the one shown in FIG. **3** on the display part **3**, the registration screen controller **32** displays a default value in the factory default print setting **14** acquired by the factory default reader **31** as an initial value in the set value display field **52** of each print setting item **51**. Thus, a user is allowed to change the factory default print setting **14** to an intended print setting through operation on the print setting registration screen G**1**. If the user performs operation for setting change on the print setting item **51**, the registration screen controller **32** changes a default value as a factory default, displayed as an initial value about this print setting item **51**, to a set value designated by the user based on the operation for setting change, thereby updating the print setting registration screen G**1**. In this way, the factory default print setting **14** is changed, as needed, to a print setting intended by the user.

The registration screen controller **32** may employ a display style indicating allowance of setting change only for a default value as a factory default displayed in the set value display field **52** of a print setting item **51** determined in advance to be an item changeable by a user. The registration screen controller **32** may employ a display style indicating prohibition of setting change for a default value as a factory default displayed in the set value display field **52** of the other print setting item **51** determined in advance to be an unchangeable item. The illustration of FIG. **3** shows the case where a default value as a factory default displayed in the set value display field **52** about a color setting is displayed in the style indicating prohibition of setting change by a user. Like in this case, if the print setting registration screen G**1** contains the set value display field **52** that prohibits setting change by the user, a pull-down menu is not displayed by operation by the user on an operation button **53***a* corresponding to this set value display field **52** to prohibit change in a set value. This can prohibit a default value about a color setting from being changed accidentally from "GRAY-SCALE" to "COLOR" during installation of the printer driver **40**, for example, thereby preventing frequent execution of needless color printing before it happens.

If operation for print setting registration by a user is detected, specifically, if the user operates the button **54**, the registration screen controller **32** puts the installation default generating part **33** into operation. The installation default generating part **33** is a processor that generates an installation default print setting **37** based on the operation for print setting registration by the user. Specifically, at the time of the operation for print setting registration by the user, the installation default generating part **33** collects set values about the corresponding print setting items **51** in the print setting registration screen G**1**, and generates a print setting defined by a combination of these set values as the installation default print setting **37**. Then, the installation default generating part **33** outputs the generated installation default print setting **37** to the installation controller **36**.

The installation controller **36** is a processor that installs the driver program **21** for the printer driver **40** on the storage region **16** in the storage **6**. The installation controller **36** reads the program data **13** about the printer driver **40** to be installed from the package program **11**. The program data **13** is compressed data of the driver program **21** for the printer driver **40**. The installation controller **36** decompresses the compressed program data **13**, thereby generating the driver program **21** for the printer driver **40**. Then, the installation controller **36** stores the driver program **21** resulting from the decompression into the storage region **16** as a free region in the storage **6** through the operating system **20**. In this way, the driver program **21** for the printer driver **40** is installed.

If the CPU **2***a* becomes ready to execute the driver program **21**, the installation controller **36** instructs the operating system **20** to execute the driver program **21**, thereby starting the printer driver **40** temporarily in the controller **2**. The installation controller **36** includes an output part **36***a*. After the printer driver **40** is started temporarily, the output part **36***a* outputs the factory default print setting **14** and the installation default print setting **37** to the printer driver **40**.

After being started temporarily at the time of installation of the printer driver **40**, the printer driver **40** comes into operation to function as a print setting managing part **41** and a standard setting managing part **42**. The print setting managing part **41** stores the factory default print setting **14** and the installation default print setting **37** output from the installer **30** into the storage region **16**, and manages the stored print settings. More specifically, the print setting managing part **41** generates a driver management region **22** through the operating system **20**. The driver management region **22** is a storage region under management of the printer driver **40**. The printer driver **40** manages the driver management region **22** as a storage region not rewritable for a user. Specifically, the driver management region **22** is a first storage region not rewritable for the user. The print setting managing part **41** stores the installation default print setting **37** and the factory default print setting **14** into the driver management region **22** that prohibits rewrite of data therein by the user, and manages the stored print settings. Thus, after installation of the printer driver **40** is finished, the print settings **37** and **14** stored in the driver management region **22** are managed in a manner that prohibits rewrite by the user.

The print setting managing part **41** outputs the installation default print setting **37** to the operating system **20**. At this time, the print setting managing part **41** instructs the operating system **20** to store the installation default print setting **37** into an OS management region **23** under management of the operating system **20**. This makes the operating system **20** store the installation default print setting **37** output from the print setting managing part **41** into the OS management region **23** such as a registry under management of the operating system **20** itself, and manage the stored print setting. As shown in FIG. **2**, the OS management region **23** includes a user region **24** and a common region **25**. The user region **24** is a storage region allocated to each user. The common region **25** is a storage region commonly usable by a plurality of users. Each of the user region **24** and the common region **25** is a second storage region rewritable for a user. The operating system **20** stores the installation default print setting **37** into each of the user region **24** and the common region **25**, and manages the stored print setting. The installation default print setting **37** stored in each of the user region **24** and the common region **25** may be rewritten thereafter by the user as a different print setting.

The selection screen controller **34** of the installer **30** is a processor that displays a standard setting selection screen on the display part **3**. The standard setting selection screen is a screen in which a user is caused to select a print setting in

advance to become a standard setting at the printer driver **40** from a plurality of print settings stored in the driver management region **22** and the OS management region **23**. For example, the selection screen controller **34** comes into operation after the installation default generating part **33** generates the installation default print setting **37**. After the user performs operation for inputting an intended print setting, the selection screen controller **34** displays the standard setting selection screen on the display part **3**, and accepts operation for selecting a print setting to become a standard setting at the printer driver **40**.

FIGS. **4**A and **4**B show an example of a standard setting selection screen G**2**. The standard setting selection screen G**2** shown in FIG. **4**A is to allow selection of a print setting to be reflected in response to operation by a user on a standard setting button used for restoring a standard setting. The standard setting button is in a print setting screen for the printer driver **40**. The standard setting selection screen G**2** shown in FIG. **4**A includes a standard setting display field **55** in which a print setting to become a standard setting is displayed, and an operation button **56** used for displaying a pull-down menu if the user intends to change a print setting displayed in the standard setting display field **55** to a different print setting. In the illustration of FIG. **4**A, the installation default print setting **37** is displayed as a standard setting in the standard setting display field **55**. Like in this case, if the installation default print setting **37** is designated as a standard setting, the printer driver **40** handles the installation default print setting **37** stored in the driver management region **22** as a standard setting.

A user intending to change a print setting to become a standard setting clicks the operation button **56**. Then, a pull-down menu **59** such as the one shown in FIG. **4**B is displayed. The pull-down menu **59** contains the installation default print setting **37** and the factory default print setting **14** stored in the driver management region **22**, a print setting stored in the user region **24**, and a print setting stored in the common region **25**. Thus, the user is allowed to select one from a plurality of print settings displayed in a list form in the pull-down menu **59** as a standard setting for the printer driver **40**. In particular, according to this preferred embodiment, operating the standard setting selection screen G**2** allows the user to select an intended print setting, input at the time of installation of the printer driver **40**, as a standard setting for the printer driver **40**.

The standard setting selection screen G**2** shown in FIG. **4**A contains an OK button **58** and a return button **57** displayed at the bottom of the standard setting selection screen G**2**. The OK button **58** is used for designating a print setting displayed in the standard setting display field **55** as a standard setting. The return button **57** is used for returning to a previous screen. A user operates the OK button **58** to confirm a print setting displayed in the standard setting display field **55** as a standard setting. This puts the standard setting designating part **35** into operation in the installer **30**.

The standard setting designating part **35** generates standard setting information **49** containing a designated standard setting for the printer driver **40**. The standard setting information **49** contains one of the installation default print setting **37** and the factory default print setting **14** stored in the driver management region **22**, a print setting stored in the user region **24**, and a print setting stored in the common region **25** designated as a standard setting. The standard setting designating part **35** outputs the standard setting information **49** to the installation controller **36**.

While the printer driver **40** runs temporarily, the installation controller **36** makes the output part **36***a* output the standard setting information **49** to the printer driver **40** together with output of the factory default print setting **14** and the installation default print setting **37** to the printer driver **40**.

The standard setting managing part **42** of the printer driver **40** acquires the standard setting information **49** output from the installer **30**, and manages the acquired standard setting information **49**. For example, the standard setting managing part **42** stores the standard setting information **49** into either the driver management region **22** or the OS management region **23**, and manages the stored information. The standard setting information **49** stored in the driver management region **22** cannot be rewritten thereafter. By contrast, the standard setting information **49** stored in the OS management region **23** can be rewritten thereafter. According to an example described in this preferred embodiment, in consideration of a probability that a user will change a standard setting after installation of the printer driver **40** is finished, the standard setting information **49** is stored into the OS management region **23**.

As described above, according to this preferred embodiment, a print setting input by a user at the time of installation of the printer driver **40** is stored as the installation default print setting **37** into the driver management region **22** not rewritable for the user. This allows the printer driver **40** to retain the installation default print setting **37** input for the first time by the user in a manner that prohibits rewrite of the installation default print setting **37**. If the printer driver **40** becomes functional to manage the installation default print setting **37** and the standard setting information **49** at the time of installation of the printer driver **40**, installation of the printer driver **40** is finished. Thus, the installer **30** finishes running of the printer driver **40** having been started temporarily and then finishes the running state of the installer **30** itself.

Described next is how the printer driver **40** installed on the information processing apparatus **1** by the above-described manner functions while the printer driver **40** runs normally. If a user gives an instruction to make a print to a running application such as a document editing application, for example, the application instructs the operating system **20** to start the printer driver **40**. Then, the operating system **20** executes the driver program **21** installed on the storage region **16** to start the printer driver **40** normally in the controller **2**.

FIG. **5** is a block diagram showing a functional configuration formed if the printer driver **40** is started normally. If the printer driver **40** is started normally after being installed on the information processing apparatus **1**, the printer driver **40** comes into operation to function as a screen controller **43**, a standard setting designating part **44**, a job generating part **45**, and a job output part **46** in addition to the above-described print setting managing part **41** and standard setting managing part **42**.

The screen controller **43** is a processor that controls a display screen to be displayed on the display part **3**. The screen controller **43** has the functions of a setting screen controller **43***a*, a selection screen controller **43***b*, and a print setting selection screen controller **43***c*. The setting screen controller **43***a* is a processor that displays a print setting screen G**3** on the display part **3** and accepts operation for making a print setting by a user.

FIG. **6** shows an example of the print setting screen G**3** displayed by the setting screen controller **43***a*. As shown in FIG. **6**, the displayed print setting screen G**3** contains a plurality of print setting items **61** settable at the printer driver **40**. The print setting items **61** are the same as the print

setting items **51** displayed in the print setting registration screen G**1** at the time of installation of the printer driver **40**. Each print setting item **61** contains a set value display field **62** in which a current set value is displayed, and an operation button **63** used for displaying a pull-down menu if a user intends to change a set value displayed in a corresponding set value display field **62**.

To display the print setting screen G**3** at the time of start of the printer driver **40**, the setting screen controller **43***a* acquires the standard setting information **49** under management of the standard setting managing part **42**. Based on the acquired standard setting information **49**, the setting screen controller **43***a* determines a print setting designated as a standard setting for the printer driver **40**. Then, the setting screen controller **43***a* requests the print setting managing part **41** to output the determined print setting to the setting screen controller **43***a*. Based on the request from the setting screen controller **43***a*, the print setting managing part **41** reads the print setting designated as a standard setting for the printer driver **40** from the driver management region **22** or the OS management region **23**, and outputs the read print setting to the setting screen controller **43***a*. Based on the print setting acquired from the print setting managing part **41**, the setting screen controller **43***a* generates an initial screen in which a set value according to the standard setting is displayed in the set value display field **62** of each print setting item **61**, and displays the initial screen on the display part **3**. At this time, if the installation default print setting **37** is designated as the standard setting, for example, the print setting screen G**3** in which the installation default print setting **37** stored in the driver management region **22** is reflected is displayed as the initial screen on the display part **3**. Then, a user operates the operation button **63** of each print setting item **61** to display a pull-down menu. In this way, the user becomes capable of changing a set value about each print setting item **61** to an intended set value. Specifically, the setting screen controller **43***a* rewrites a set value displayed in the set value display field **62** of each print setting item **61** in the print setting screen G**3** based on the setting operation by the user, thereby updating the print setting screen G**3**.

The print setting screen G**3** further contains a standard setting button **67** used for restoring a set value displayed in the set value display field **62** of each print setting item **61** to a print setting as a standard setting. The standard setting button **67** is a button used for accepting operation for standard setting reflection by a user. If the user operates the standard setting button **67**, the setting screen controller **43***a* requests the print setting managing part **41** to output a print setting as the standard setting to the setting screen controller **43***a* based on the standard setting information **49**, as the setting screen controller **43***a* does at the time of start of the printer driver **40**. Based on the print setting as the standard setting acquired from the print setting managing part **41**, the setting screen controller **43***a* displays a set value according to the standard setting in the set value display field **62** of each print setting item **61**, thereby updating the print setting screen G**3**. Thus, if the installation default print setting **37** is designated as the standard setting, the user is allowed to restore the print setting screen G**3** at any time in which the installation default print setting **37** is reflected by performing the operation for standard setting reflection.

The print setting screen G**3** contains a standard change button **68** used for changing a standard setting for the printer driver **40**. The standard change button **68** is used for accepting operation for standard setting change by a user. If the standard change button **68** is operated, the selection screen controller **43***b* comes into operation in the screen controller **43**. In response to the operation on the standard change button **68**, the selection screen controller **43***b* displays a standard setting selection screen on the display part **3**. The standard setting selection screen is a screen in which the user is caused to select a print setting to become a standard setting at the printer driver **40** from a plurality of print settings stored in the driver management region **22** and the OS management region **23**. Then, the selection screen controller **43***b* accepts operation for changing the print setting to become a standard setting at the printer driver **40**.

FIG. **7** shows an example of a standard setting selection screen G**4**. As shown in FIG. **7**, based on operation for standard setting change by a user, the selection screen controller **43***b* displays the standard setting selection screen G**4** in a pop-up style in front of the print setting screen G**3**. The standard setting selection screen G**4** allows selection of a print setting to be reflected in response to operation for standard setting reflection by a user on the print setting screen G**3** for the printer driver **40**. The standard setting selection screen G**4** has a pull-down menu style such as the one shown in FIG. **7**. The displayed pull-down menu contains the installation default print setting **37** and the factory default print setting **14** stored in the driver management region **22**, a print setting stored in the user region **24**, and a print setting stored in the common region **25**. Thus, the user is allowed to select one from a plurality of print settings displayed in a list form in the standard setting selection screen G**4** as a standard setting for the printer driver **40**. If the user selects one print setting, the selection screen controller **43***b* puts the standard setting designating part **44** into operation.

The standard setting designating part **44** functions in the same way as the standard setting designating part **35** that comes into operation in the installer **30** at the time of installation of the printer driver **40**. The standard setting designating part **44** generates the standard setting information **49** containing a designated standard setting for the printer driver **40**. The standard setting information **49** contains one of the installation default print setting **37** and the factory default print setting **14** stored in the driver management region **22**, a print setting stored in the user region **24**, and a print setting stored in the common region **25** designated as a standard setting. Specifically, the standard setting designating part **44** generates the standard setting information **49** containing one print setting designated as a standard setting based on selecting operation performed on the standard setting selection screen G**4** by a user. The standard setting designating part **44** outputs the generated standard setting information **49** to the standard setting managing part **42**. In this way, the standard setting information **49** under management of the standard setting managing part **42** is updated.

Referring back to FIG. **6**, the print setting screen G**3** contains the following displayed at the top of the print setting screen G**3**: a favorite setting display field **64** in which a print setting reflected in each print setting item **61** in the print setting screen G**3** is displayed; an operation button **65** used for changing a print setting displayed in the favorite setting display field **64** to a different print setting, and displaying a print setting selection screen for calling the different print setting; and an edit button **66** used by a user for editing a print setting to be set as a favorite. If the print setting screen G**3** in which a print setting designated as a standard setting is displayed as an initial screen at the time of start of the printer driver **40**, for example, the name of the print setting corresponding to the standard setting is dis-

played in the favorite setting display field **64**. In the illustration of FIG. **6**, the installation default print setting **37** is displayed in the favorite setting display field **64**, and a set value determined based on the installation default print setting **37** is displayed in each print setting item **61**.

By operating the operation button **65**, a user is allowed to select a print setting to be reflected in the print setting screen G**3** from a plurality of print settings stored in the driver management region **22** and the OS management region **23**. Specifically, the operation on the operation button **65** by the user is operation for calling a print setting to be reflected in the print setting screen G**3**.

FIGS. **8**A and **8**B show a transition between screens made in response to operation for print setting call by a user. First, if the user performs the operation for print setting call as shown in FIG. **8**A, the print setting selection screen controller **43***c* comes into operation in the screen controller **43**. If the operation for print setting call by the user is detected, the print setting selection screen controller **43***c* displays a print setting selection screen G**5** in which the user is caused to select a print setting to be reflected in the print setting screen G**3** from a plurality of print settings stored in each of the driver management region **22** and the OS management region **23**. The print setting selection screen G**5** is a screen in which a print setting to be reflected directly in the print setting screen G**3** for the printer driver **40** is selected. The print setting selection screen G**5** has a pull-down menu style such as the one shown in FIG. **8**A, for example. The displayed pull-down menu contains the installation default print setting **37** and the factory default print setting **14** stored in the driver management region **22**, a print setting stored in the user region **24**, and a print setting stored in the common region **25**. Thus, by selecting one from a plurality of print settings displayed in a list form in the print setting selection screen G**5**, the user is allowed to call the selected print setting and reflect this print setting in the print setting screen G**3**. Specifically, the setting screen controller **43***a* accepts the above-described selecting operation on the print setting selection screen G**5** by the user as operation for print setting reflection, acquires a print setting selected by the user from the print setting managing part **41**, and reflects the acquired print setting in each print setting item **61** in the print setting screen G**3**. As a result, the print setting screen G**3** shown in FIG. **8**A is changed to a print setting screen G**3** such as the one shown in FIG. **8**B, for example. The illustration of FIG. **8**B shows the case where a print setting stored in the user region **24** in the OS management region **23** is selected.

According to this preferred embodiment, the installation default print setting **37** stored in the driver management region **22** is displayed in the print setting selection screen G**5** to be displayed in response to operation for print setting call by a user. Thus, even if the installation default print setting **37** is not designated as a standard setting for the printer driver **40**, the user is still allowed to restore the print setting screen G**3** at any time in which the installation default print setting **37** is reflected by performing the operation for print setting call.

The print setting screen G**3** further contains an OK button **69**, a cancel button **70**, and an apply button **71** that are displayed at the bottom of the print setting screen G**3**. The OK button **69** is used for confirming a set value about each print setting item **61** and instructing generation of a print job. The cancel button **70** is used for cancelling operation for changing a print setting. The apply button **71** is used for registering and storing a print setting containing a current set value about each print setting item **61**.

If a user operates the apply button **71**, the setting screen controller **43***a* outputs a current set value about each print setting item **61** to the print setting managing part **41**. The print setting managing part **41** stores a print setting determined based on the set value output from the setting screen controller **43***a* into the user region **24** or the common region **25** in the OS management region **23**, and manages the stored print setting. If the user performs operation for changing a set value and then operates the apply button **71** while the installation default print setting **37** read from the driver management region **22** is reflected in the print setting screen G**3**, for example, the print setting managing part **41** generates a new print setting by combining set values about corresponding print setting items **61**, stores the new print setting into the user region **24** or the common region **25** in the OS management region **23**, and manages the stored print setting. Meanwhile, if the user performs operation for changing a set value and then operates the apply button **71** while a print setting read from the user region **24** or the common region **25** is reflected in the print setting screen G**3**, for example, the print setting managing part **41** overwrites the print setting originally stored in the user region **24** or the common region **25** with the set value designated by the user, and stores the overwritten print setting. In this way, a print setting stored in the user region **24** or the common region **25** is changed in response to operation on the apply button **71** by the user.

In response to operation on the edit button **66** by a user, the print setting managing part **41** may not overwrite a print setting originally stored in the user region **24** or the common region **25** with a set value designated by the user. In this case, the print setting managing part **41** can generate a new print setting by combining set values about corresponding print setting items **61**, store the new print setting into the user region **24** or the common region **25**, and manage the stored new print setting.

The job generating part **45** of the printer driver **40** comes into operation in response to operation on the OK button **69** by a user. The job generating part **45** acquires print data such as a document from an application currently running in the controller **2**, and generates a print job in which a print setting designated by the user is reflected. Then, the job generating part **45** outputs the print job to the job output part **46**. The job output part **46** executes processing of outputting the print job generated by the job generating part **45** to a printing apparatus through the communication interface **5**.

The following describes a procedure of processing executed by the installer **30** during installation of the printer driver **40**. FIG. **9** is a flowchart showing an example of the procedure of the processing executed by the installer **30**. This processing is executed in response to execution of the installation program **12** in the controller **2** of the information processing apparatus **1**.

As shown in FIG. **9**, if the installer **30** is started in the controller **2** (step S**10**), the installer **30** first reads the factory default print setting **14** (step S**11**), and displays the print setting registration screen G**1** on the display part **3** (step S**12**). Then, the installer **30** accepts operation for print setting registration by a user (step S**13**), and generates the installation default print setting **37** (step S**14**). Next, the installer **30** displays the standard setting selection screen G**2** on the display part **3** (step S**15**), and accepts selecting operation by the user (step S**16**). Then, based on the selecting operation by the user, the installer **30** generates the standard setting information **49** containing one print setting selected from a plurality of print settings and designated as a standard setting (step S**17**).

Next, the installer **30** starts installation of the printer driver **40** (step S**18**). As a result, the driver program **21** is installed on the storage region **16** in the storage **6**. After starting the installation, the installer **30** continues the installation until the printer driver **40** is brought to a state allowing start of the printer driver **40** (step S**19**). If the printer driver **40** is in the state allowing start of the printer driver **40** (YES of step S**19**), the installer **30** starts the printer driver **40** temporarily (step S**20**). Then, the installer **30** outputs the installation default print setting **37** to the printer driver **40** (step S**21**), and outputs the factory default print setting **14** to the printer driver **40** (step S**22**). At this time, the installer **30** instructs the printer driver **40** to store the installation default print setting **37** and the factory default print setting **14** into a storage region not rewritable for the user. In response, the printer driver **40** stores the installation default print setting **37** and the factory default print setting **14** into the driver management region **22**, and manages the stored print settings. In this way, the installation default print setting **37** and the factory default print setting **14** are managed in a manner that prohibits rewrite by the user.

The installer **30** outputs the standard setting information **49** to the printer driver **40** (step S**23**). Then, the printer driver **40** acquires and manages the standard setting information **49**. In this way, the printer driver **40** becomes capable of reflecting a print setting designated as a standard setting in the print setting screen G**3** at the time of subsequent start of the printer driver **40** or based on operation for standard setting reflection by the user. If the above-described processing is finished, the installer **30** finishes running of the printer driver **40** (step S**24**), and finishes the running state of the installer **30** itself. Then, the processing is finished completely (step S**25**).

The following describes a procedure of processing executed by the printer driver **40** started temporarily at the time of installation of the printer driver **40**. FIG. **10** is a flowchart showing an example of the procedure of the processing executed by the printer driver **40** started temporarily at the time of installation of the printer driver **40**. This processing is executed in response to execution of the driver program **21** in the controller **2** of the information processing apparatus **1**.

If the printer driver **40** is started by the installer **30** (step S**30**), the printer driver **40** acquires the installation default print setting **37** output from the installer **30** (step S**31**). Then, the printer driver **40** stores the acquired installation default print setting **37** into the driver management region **22** (step S**32**). After storing the installation default print setting **37** into the driver management region **22**, the printer driver **40** stores the installation default print setting **37** in the driver management region **22** further into the user region **24** and the common region **25** in the OS management region **23** (step S**33**). This allows the user to call the installation default print setting **37** from the user region **24** or the common region **25** and change a print setting.

Next, the printer driver **40** acquires the factory default print setting **14** output from the installer **30** (step S**34**), and stores the acquired factory default print setting **14** into the driver management region **22** (step S**35**). Then, the printer driver **40** acquires the standard setting information **49** output from the installer **30** (step S**36**), and stores the acquired standard setting information **49** into the OS management region **23** (step S**37**). Then, the processing executed by the printer driver **40** started at the time of installation of the printer driver **40** is finished.

The following describes a procedure of processing executed by the printer driver **40** started normally after installation of the printer driver **40**. FIG. **11** is a flowchart showing an example of the procedure of the processing executed by the printer driver **40** if the printer driver **40** is started normally. This processing is also executed in response to execution of the driver program **21** in the controller **2** of the information processing apparatus **1**.

If the printer driver **40** is started in response to detection of an instruction given by the user to make a print (step S**40**), the printer driver **40** first reads the standard setting information **49** (step S**41**). Then, based on the read standard setting information **49**, the printer driver **40** reads a print setting designated as a standard setting for the printer driver **40** (step S**42**). Next, the printer driver **40** displays the print setting screen G**3** on the display part **3** in which the print setting read in step S**42** is reflected (step S**43**).

Then, the printer driver **40** determines whether or not operation by the user is detected (step S**44**). If operation by the user is detected (YES of step S**44**), the printer driver **40** determines whether or not this operation by the user is operation for making a print setting (step S**45**). If the operation by the user is determined to be operation for making a print setting (YES of step S**45**), the printer driver **40** executes screen updating processing (step S**46**). This screen updating processing is to update the print setting screen G**3** by changing a set value about each print setting item **61** displayed in the print setting screen G**3** based on the operation for making a print setting by the user.

If the operation by the user is not operation for making a print setting (NO of step S**45**), the printer driver **40** determines whether or not the operation by the user is operation for giving an instruction to execute a job (step S**47**). This determination is YES if the user operates the OK button **69** in the print setting screen G**3**. If the operation by the user is determined to be operation for giving an instruction to execute a job (YES of step S**47**), the printer driver **40** generates a print job (step S**48**), and outputs the generated print job to a printing apparatus (step S**49**).

If the operation by the user is not operation for giving an instruction to execute a job (NO of step S**47**), the printer driver **40** executes operation responsive processing (step S**50**). This operation responsive processing to be executed is responsive to the operation by the user.

FIG. **12** is a flowchart showing an example of a detailed procedure of the operation responsive processing (step S**50**). After starting this processing, the printer driver **40** determines whether or not the user has performed operation for print setting registration by operating the apply button **71** (step S**51**). If the operation by the user is operation for print setting registration (YES of step S**51**), the printer driver **40** acquires a current print setting in the print setting screen G**3** (step S**52**). Then, the printer driver **40** stores the acquired print setting into the user region **24** or the common region **25** in the OS management region **23** (step S**53**).

If the operation by the user is determined not to be operation for print setting registration (NO of step S**51**), the printer driver **40** thereafter determines whether or not the operation by the user is operation for standard setting change performed on the standard change button **68** (step S**54**). If the operation by the user is determined to be operation for standard setting change (YES of step S**54**), the printer driver **40** displays the standard setting selection screen G**4** on the display part **3** (step S**55**), and accepts selecting operation by the user (step S**56**). Then, based on the selecting operation by the user, the printer driver **40** generates the standard setting information **49** containing one print setting selected

from a plurality of print settings and designated as a standard setting (step S57), and updates the standard setting information 49 (step S58).

If the operation by the user is determined not to be operation for standard setting change (NO of step S54), the printer driver 40 thereafter determines whether or not the operation by the user is operation for print setting call performed on the operation button 65 (step S59). If the operation by the user is determined to be operation for print setting call (YES of step S59), the printer driver 40 displays the print setting selection screen G5 on the display part 3 (step S60), and accepts selecting operation by the user (step S61). Next, the printer driver 40 reads one print setting selected by the user (step S62) and reflects the read print setting in the print setting screen G3, thereby updating the print setting screen G3 (step S63).

If the operation by the user is determined not to be operation for print setting call (NO of step S59), the printer driver 40 thereafter determines whether or not the operation by the user is operation for standard setting reflection performed on the standard setting button 67 (step S64). If the operation by the user is determined to be operation for standard setting reflection (YES of step S64), the printer driver 40 reads the standard setting information 49 (step S65), and reads a print setting as a standard setting designated by the standard setting information 49 (step S66). Then, the printer driver 40 reflects the print setting as the standard setting in the print setting screen G3, thereby updating the print setting screen G3 (step S67). Then, the operation responsive processing is finished.

As described above, if the printer driver 40 is started normally in the information processing apparatus 1, a user is allowed to make an intended print setting by operating the print setting screen G3. In particular, if the user performs operation for registering an intended print setting, this intended print setting is stored into the user region 24 or the common region 25 in the OS management region 23. This prevents rewrite of the installation default print setting 37 stored in the driver management region 22. Thus, the user is allowed to reflect an intended print setting at any time input first at the time of installation of the printer driver 40 through simple operation such as operation for standard setting reflection or operation for print setting call.

According to this preferred embodiment, an intended print setting input by a user at the time of installation of the printer driver is stored into the first storage region (driver management region 22) not rewritable for a user, and managed in the first storage region. This allows the user to restore the print setting at any time through simple operation input for the first time.

Second Preferred Embodiment

A second preferred embodiment of the present invention will be described next. FIG. 13 is a block diagram showing an example of the functional configuration of the printer driver 40 according to the second preferred embodiment. The information processing apparatus 1 contains a plurality of installed applications including an application 81, an application 82, an application 83, and an application 84. The controller 2 is allowed to start these applications 81 to 84 individually. Based on an instruction by a user to make a print, each of the applications 81 to 84 instructs the operating system 20 to start the printer driver 40. In this way, the printer driver 40 can be started normally in the controller 2.

The printer driver 40 according to this preferred embodiment has the functions of an application determining part 91 and an application managing part 92 in addition to the structures described in the first preferred embodiment. The printer driver 40 is configured in such a manner that the printer driver 40 is allowed to read a print setting associated in advance with an application by which the printer driver 40 has been started from the driver management region 22 or the OS management region 23, and reflect the read print setting in the print setting screen G3.

The application determining part 91 is a processor that determines the application 81, 82, 83, or 84 having instructed the operating system 20 to start the printer driver 40. Based on information acquired from the operating system 20, the application determining part 91 determines which one of the applications 81 to 84 has started the printer driver 40. If an application having started the printer driver 40 is determined by the application determining part 91, the application managing part 92 comes into operation.

The application managing part 92 manages application information 93. Based on the application information 93, the application managing part 92 determines a print setting associated in advance with an application having started the printer driver 40.

FIG. 14 shows an example of the application information 93. The application information 93 contains an application 93*a* and a default setting 93*b* associated one-to-one with each other. Thus, referring to the application information 93 makes it possible to determine a default print setting associated with one application.

Based on the application information 93, the application managing part 92 determines a print setting associated in advance with an application determined by the application determining part 91 to be an application having started the printer driver 40. The application managing part 92 notifies the print setting managing part 41 of the determined print setting. This allows the print setting managing part 41 to read the print setting associated with the application having started the printer driver 40, and output the read print setting to the setting screen controller 43*a* of the screen controller 43. As a result, the setting screen controller 43*a* is allowed to display the print setting screen G3 on the display part 3 as an initial screen for the printer driver 40 in which the print setting associated in advance with the application having started the printer driver 40 is reflected. Thus, according to this preferred embodiment, if the applications 81 to 84 start the printer driver 40 individually, the print setting screen G3 displayed as an initial screen for the printer driver 40 differs among the applications. By registering an intended combination of an application and a print setting in advance with the application information 93, a user is allowed to minimize the frequency of performing operation for making a print setting after start of the printer driver 40. As a result, operability is improved.

A user may register the application information 93 in advance using the function of the installer 30 at the time of installation of the printer driver 40, or may register the application information 93 at the discretion of the user after installation of the printer driver 40.

The setting screen controller 43*a* may be configured to display a result of determination about a print setting associated with one application made by the application determining part 91, and accept operation for confirming the result by a user. In this case, by detecting the confirming operation by the user, the setting screen controller 43*a* reflects a print setting associated in advance with an application having started the printer driver 40 in the print setting screen G3, and displays the resultant print setting screen G3. By doing so, the print setting associated in advance with the

application having started the printer driver **40** is reflected in the print setting screen G**3** on condition that the print setting is confirmed by the user, thereby offering a high degree of convenience to the user.

The configuration and the operation of the installer **30** and those of the printer driver **40** according to this preferred embodiment are the same in other respects as those of the installer **30** and those of the printer driver **40** according to the first preferred embodiment described above.

Third Preferred Embodiment

A third preferred embodiment of the present invention will be described next. According to an example of this preferred embodiment described below, the installer **30** installs a plurality of printer drivers **40** on the storage **6** of the information processing apparatus **1**.

FIG. **15** shows an example of an initial screen G**7** displayed on the display part **3** if the installer **30** is started in this preferred embodiment. The initial screen G**7** allows a user to select a printer driver **40** from a plurality of printer drivers **40** that can be installed by the installer **30**. Specifically, the user is allowed to select a printer driver **40** to be installed by giving a check mark in a check box **75***a*, a check box **75***b*, or a check box **75***c* displayed on the left side of the name of each printer driver. In the illustration of FIG. **15**, the installer **30** is allowed to install three printer drivers **40** and the user has selected all of the three printer drivers **40** to be installed. If the user operates a button **76** displayed at the bottom of the initial screen G**7**, the installer **30** displays the print setting registration screen G**1** described in the first preferred embodiment on the display part **3** for installing all the printer drivers **40** sequentially, one by one, selected by the user.

For installation of the printer drivers **40**, the installer **30** executes the processing repeatedly described in the first preferred embodiment on all the printer drivers **40** to be installed. Specifically, the registration screen controller **32** displays the print setting registration screens G**1** sequentially about print settings settable at the corresponding printer drivers **40**. Based on operations for print setting registration on these print setting registration screens G**1** by a user, the installation default generating part **33** generates the installation default print settings **37** about the corresponding printer drivers **40** sequentially. For installation of the printer drivers **40** individually, the installation controller **36** outputs the installation default print setting **37** about each of the printer drivers **40** to this printer driver **40**. In this way, each printer driver **40** installed on the storage **6** becomes capable of storing the installation default print setting **37** into the driver management region **22** belonging to the printer driver **40** itself and managing the stored print setting **37**. As a result, the installation default print setting **37** about each of the printer drivers **40** is stored into a region not rewritable for the user.

The configuration and the operation of the installer **30** and those of the printer driver **40** according to this preferred embodiment are the same in other respects as those of the installer **30** and those of the printer driver **40** according to the first preferred embodiment described above.

Modifications

The present invention is not to be limited to the substance of the above-described preferred embodiments but various modifications are applicable to the present invention.

For example, according to the above-described preferred embodiments, if the printer driver **40** is brought to a state allowing start of the printer driver **40** during installation of the printer driver **40** by the installer **30**, the installer **30** starts the printer driver **40** temporarily and outputs the installation default print setting **37** and the standard setting information **49** to the printer driver **40**. However, the installer **30** does not always start the printer driver **40** temporarily during installation of the printer driver **40**. For example, the installer **30** may store the installation default print setting **37** and the standard setting information **49** into a storage region to which the printer driver **40** always accesses when the printer driver **40** is started for the first time. In this case, when the printer driver **40** is started for the first time after its installation, the printer driver **40** becomes capable of acquiring the installation default print setting **37** and the standard setting information **49** automatically, and managing the acquired print setting **37** and the acquired standard setting information **49** thereafter.

According to the examples in the above-described preferred embodiments, the factory default print setting **14** is installed on the storage **6** at the time of installation of the printer driver **40**. However, the factory default print setting **14** is not always required to be installed on the storage **6**.

Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustrated and example only and is not to be taken by way limitation, the scope of the present invention being interpreted by terms of the appended claims.

What is claimed is:

1. An information processing apparatus comprising a storage, the information processing apparatus starting an installer to install a printer driver on the storage, the installer comprising:

a registration screen controller displaying a print setting registration screen including one or more settable, default print setting items and receiving input from a user changing at least one of the one or more print setting items;

an installation default generator generating an installation default print setting based on the change to the at least one print setting item; and

an output part outputting the installation default print setting to the printer driver when installing the printer driver,

wherein the printer driver comprises a print setting manager that (i) stores the installation default print setting into a first storage region in the storage and (ii) manages the stored installation default print setting, the first storage region being a region that is not rewritable by the user,

wherein the printer driver is configured to restore to a print setting screen the one or more print setting items that either include or do not include the change based on a prior selection by the user, and

wherein the selection is made from among a list of options that includes factory default print settings, installation default print settings, user region print settings, and common region print settings, the factory default print settings being related to the print setting items that do not include the change, and the installation default print settings being related to the print setting items that do include the change.

2. The information processing apparatus according to claim **1**, wherein the printer driver further comprises a setting screen controller that (i) displays the print setting screen in which the installation default print setting under

management of the print setting manager is reflected, (ii) rewrites the installation default print setting as a print setting intended by the user based on setting operation on the print setting screen by the user, and (iii) reflects the rewritten print setting in the print setting screen, and

wherein, based on operation for registration by the user, the print setting manager stores the print setting reflected in the print setting screen into a second storage region in the storage, the second storage region being a region rewritable by the user.

3. The information processing apparatus according to claim **2**, wherein, based on operation for standard setting reflection by the user, the setting screen controller reads the installation default print setting from the first storage region, and reflects the read installation default print setting in the print setting screen.

4. The information processing apparatus according to claim **2**, wherein the installer further comprises:

a selection screen controller that displays a standard setting selection screen in which the user is caused to select a print setting in advance to be reflected in the print setting screen from the installation default print setting stored in the first storage region and the print setting stored in the second storage region; and

a standard setting designator that generates standard setting information containing one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region as a designated print setting based on selecting operation on the standard setting selection screen by the user,

wherein the output part outputs the standard setting information to the printer driver at the time of installation of the printer driver,

wherein the printer driver further comprises a standard setting manager that manages the standard setting information output from the installer, and

wherein, if operation for standard setting reflection by the user is detected, the setting screen controller reads one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region, and reflects the read print setting in the print setting screen based on the standard setting information.

5. The information processing apparatus according to claim **2**, wherein the printer driver further comprises:

a selection screen controller that displays a standard setting selection screen in which the user is caused to select a print setting to be reflected in the print setting screen from the installation default print setting stored in the first storage region and the print setting stored in the second storage region;

a standard setting designator that generates standard setting information containing one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region as a designated print setting based on selecting operation on the standard setting selection screen by the user; and

a standard setting manager that manages the standard setting information generated by the standard setting designator, and

if operation for standard setting reflection by the user is detected, the setting screen controller reads one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region, and reflects the read print setting in the print setting screen based on the standard setting information.

6. The information processing apparatus according to claim **2**, wherein the printer driver further comprises a print setting selection screen controller, if operation for print setting call by the user is detected, the print setting selection screen controller displaying a print setting selection screen in which the user is caused to select a print setting to be reflected in the print setting screen from the installation default print setting stored in the first storage region and the print setting stored in the second storage region, and

wherein, based on selecting operation on the print setting selection screen by the user, the setting screen controller reads one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region, and reflects the read print setting in the print setting screen.

7. The information processing apparatus according to claim **2**, further comprising a plurality of applications to start the printer driver,

wherein the printer driver further comprises:

an application manager that manages application information containing association determined in advance between each of the applications and one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region; and

an application determinator that determines one of the applications to be an application having started the printer driver, and

the setting screen controller determines a print setting associated with the one application determined by the application determinator based on the application information, and, based on a result of the determination, the setting screen controller reads one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region, and reflects the read print setting in the print setting screen.

8. The information processing apparatus according to claim **7**, wherein the setting screen controller displays the result of the determination about the print setting associated with the one application determined by the application determinator, and accepts operation for confirming the result by the user.

9. The information processing apparatus according to claim **1**, wherein the installer installs a plurality of printer drivers on the storage,

wherein the registration screen controller displays the print setting registration screen about a print setting settable at each of the printer drivers,

wherein the installation default generator generates the installation default print setting for each of the printer drivers based on operation for print setting registration on the print setting registration screen by the user, and

wherein, for installation of each of the printer drivers, the output part outputs the installation default print setting for each of the printer drivers to this printer driver.

10. The information processing apparatus according to claim **1**, wherein the installation default generator generates the installation default print setting by accepting operation for print setting registration by the user only on a print setting item belonging to a plurality of print setting items and determined in advance to be a settable print setting item.

11. The information processing apparatus according to claim **1**, wherein the registration screen controller displays

the print setting registration screen while a factory default print setting is reflected in the print setting registration screen, and

wherein, based on operation for print setting registration on the print setting registration screen by the user, the installation default generator rewrites the factory default print setting to generate the installation default print setting.

12. A non-transitory recording medium storing a computer-readable printer driver to be executed by an information processing apparatus comprising a storage, the printer driver causing the information processing apparatus to at least:

receive information indicative of a change, by a user, to at least one settable, default print setting item;

generate an installation default print setting based on the change to the at least one print setting item; and

execute a first step of storing an installation default print setting about at least one print setting item, including the at least one print setting item changed by the user, output from an installer during installation of the printer driver into a first storage region, the first storage region being a region in the storage and not rewritable by the user,

wherein the printer driver is configured to restore to a print setting screen one or more print setting items that either include or do not include the change based on a prior selection by the user, and

wherein the selection is made from among a list of options that includes factory default print settings, installation default print settings, user region print settings, and common region print settings, the factory default print settings being related to the print setting items that do not include the change, and the installation default print settings being related to the print setting items that do include the change.

13. The non-transitory recording medium according to claim **12**, wherein the printer driver further causes the information processing apparatus to execute:

a second step of (i) displaying the print setting screen in which the installation default print setting stored in the first storage region is reflected, (ii) rewriting the installation default print setting as a print setting intended by the user based on setting operation on the print setting screen by the user, and (iii) reflecting the rewritten print setting in the print setting screen, and

a third step of storing the print setting reflected in the print setting screen into a second storage region based on operation for registration by the user, the second region being a region in the storage and rewritable by a user.

14. The non-transitory recording medium according to claim **13**, wherein the printer driver further causes the information processing apparatus to execute a fourth step of reading the installation default print setting from the first storage region, and reflecting the read installation default print setting in the print setting screen based on operation for standard setting reflection by the user.

15. The non-transitory recording medium according to claim **14**, wherein the printer driver further causes the information processing apparatus to execute a fifth step of managing standard setting information output from the installer at the time of installation of the printer driver, the standard setting information containing one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region as a designated print setting, and

wherein, in the fourth step, if operation for standard setting reflection by the user is detected, one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region is read, and the read print setting is reflected in the print setting screen based on the standard setting information.

16. The non-transitory recording medium according to claim **14**, wherein the printer driver further causes the information processing apparatus to execute:

a fifth step of displaying a standard setting selection screen in which the user is caused to select a print setting to be reflected in the print setting screen from the installation default print setting stored in the first storage region and the print setting stored in the second storage region;

a sixth step of generating standard setting information containing one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region as a designated print setting based on selecting operation on the standard setting selection screen by the user; and

a seventh step of managing the standard setting information generated by the sixth step, and

wherein, in the fourth step, if operation for standard setting reflection by the user is detected, one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region is read, and the read print setting is reflected in the print setting screen based on the standard setting information.

17. The non-transitory recording medium according to claim **14**, wherein the printer driver further causes the information processing apparatus to execute:

an eighth step of displaying a print setting selection screen if operation for print setting call by the user is detected, the print setting selection screen being a screen in which the user is caused to select a print setting to be reflected in the print setting screen from the installation default print setting stored in the first storage region and the print setting stored in the second storage region; and

a ninth step of reading one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region, and reflecting the read print setting in the print setting screen based on selecting operation on the print setting selection screen by the user.

18. The non-transitory recording medium according to claim **14**, wherein the information processing apparatus further comprises a plurality of applications to start the printer driver, and

wherein the printer driver further causes the information processing apparatus to execute:

a tenth step of managing application information containing association determined in advance between each of the applications and one of the installation default print setting stored in the first storage region and the print setting stored in the second storage region;

an eleventh step of determining one of the applications to be an application having started the printer driver; and

a twelfth step of determining a print setting associated with the one application determined by the eleventh step based on the application information, and, based on a result of the determination, reading one of the

installation default print setting stored in the first storage region and the print setting stored in the second storage region, and reflecting the read print setting in the print setting screen.

19. The non-transitory recording medium according to claim **18**, wherein in the twelfth step, the result of the determination about the print setting associated with the one application is displayed, and operation for confirming the result by the user is accepted.

20. The information processing apparatus according to claim **1**, wherein the selection is made at a standard setting selection screen by the user during the installation of the printer driver.

* * * * *